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*Transmitted via Email*

January 17, 2020

Mr. Jeffrey Thomas  
Remedial Project Manager  
U.S. Environmental Protection Agency  
Hazardous Site Cleanup Division, 3HS23  
1650 Arch Street  
Philadelphia, PA 19103

**RE: QUARTERLY PROGRESS REPORT FOR THE AVTEX FIBERS SUPERFUND SITE FOR THE PERIOD  
OCTOBER 1 THROUGH DECEMBER 31, 2019**

Dear Mr. Thomas,

This Quarterly progress report addresses the reporting requirements in 1999 Consent Decree between the United States of America and FMC Corporation to conduct removal and remedial actions. In accordance with Section XI, Paragraph 45 of the Consent Decree, FMC has prepared this progress report to describe actions taken pursuant to the Consent Decree during the fourth quarter of 2019.

If you have any questions or comments, please call me at 215-299-6047.

Sincerely,

A handwritten signature in black ink, appearing to read 'B. McGinnis', with a long horizontal flourish extending to the right.

Brian McGinnis  
*Senior Remediation Manager*

Enclosure (1)

cc: W. Jordan, B. Kiracofe, VADEQ  
H. Philip, Parsons  
M. Robinson, Parsons



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## 1.0 INTRODUCTION

FMC Corporation (FMC) has conducted removal and remedial activities at the Avtex Fibers Superfund Site, Front Royal, Virginia (Site). The removal action, remedial design, and remedial action activities were performed pursuant to the 1999 Consent Decree between the United States of America and FMC Corporation (effective 21 October 1999).

Upon completion of the Groundwater Leachate Treatment Plant in 2014, following Site remediation activities, the Site transitioned into the Operations and Maintenance (O&M) phase. This report documents the O&M and monitoring activities and findings for the reporting period October 1, 2019 through December 31, 2019. Daily operations and maintenance activities are ongoing and meet the requirements in the Site-Wide O&M Plan (FMC, May 2015).

In accordance with Section XI of the Consent Decree, this quarterly progress report contains the following:

- Description of actions taken, and a summary of data generated by FMC during the fourth quarter (October, November, and December 2019);
- Actions scheduled for the next quarter (January, February, and March 2020);
- Description of problems and actions taken to mitigate the problems;
- Update on the schedule of actions and percentage completion of tasks;
- Modification to the Work Plans or other schedules; and
- Activities undertaken in support of the Environmental Protection Agency (EPA) Community Relations Plan.

**Attachment 1** lists correspondence and deliverables transmitted from FMC or FMC contractors to EPA, and from EPA or EPA contractors to FMC during the fourth quarter of 2019.

## 2.0 OU-7, OU-10, and NON-TIME CRITICAL REMOVAL AND REMEDIAL ACTIONS

### 2.1 ACTIONS TAKEN AND REPORTS PREPARED DURING THE REPORTING PERIOD (OCTOBER, NOVEMBER, DECEMBER 2019)

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- Completed quarterly inspection as described in Section 6 of Part 1 of the Site-Wide O&M Plan. The results are presented in **Attachment 2**.
- Completed quarterly monitoring of gas vents as described in Section 3.0 of Part 1 of the Site-Wide O&M Plan and as amended by the February 28, 2018 letter from EPA with the subject "Proposed Modification to the Passive Gas Vent and Gas Vent Filter System Inspection, Monitoring and Maintenance Section of the Site-Wide Post Closure Care Operations and Maintenance Plan (May 2015)."

- Completed quarterly post-closure OU-7 and site perimeter real time air monitoring as required by Section 2.2 of the Air Monitoring Plan Operable Unit 7, Avtex Fibers Superfund Site, Front Royal, Virginia, October 2011. The results are presented in **Attachment 3**.

## 2.2 DATA GENERATED IN DURING THE REPORTING PERIOD FOURTH QUARTER 2019

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As required by the Air Monitoring Plan, post construction quarterly air monitoring for hydrogen sulfide and organic vapors was completed in December 2019. The results and a map showing the sample locations are provided in **Attachment 3**. Hydrogen sulfide was detected at locations OU-7-SE and SW at concentrations of 0.001 ppm (below the indicator value of 0.006 ppm). Hydrogen sulfide was also detected at Site perimeter SE, SW, and downwind (location: W) at 0.001 ppm. No volatile organic compounds (VOCs) were detected at any of the monitoring locations. The following instruments were utilized to collect the real-time readings:

- Hydrogen Sulfide: Jerome 613X.
- Organic Vapor: MiniRAE 3000

The results of annual air sampling conducted in the previous quarter have been received and validated. A table summarizing the results along with the data validation report and laboratory report are presented in **Attachment 3.1**. Five of the twenty measured constituents were detected in at least one sample (carbon disulfide, carbonyl sulfide, hydrogen sulfide, methyl disulfide, and methyl sulfide). The results were compared to the USEPA Regional Screening Levels (RLS) (Hazard Quotient = 1). The hydrogen sulfide concentration measured at location PERIM-E ( $15 \mu\text{g}/\text{m}^3$ ) exceeds the industrial RSL of  $8.8 \mu\text{g}/\text{m}^3$ . This is the first-time carbon disulfide has been detected above the RSL at any location during the post construction monitoring. However, the result does not exceed the indicator value of 1.4 ppb listed in the 2011 Air Monitoring Plan for Operable Unit 7.

## 2.3 ACTIONS TO BE COMPLETED NEXT PERIOD (JANUARY, FEBRUARY, MARCH 2020)

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- Complete quarterly water level measurements as described in Section 2 of the Groundwater Monitoring Plan (GMP).
- Complete quarterly inspection as described in Section 6 of Part 1 of the Site-Wide O&M Plan.
- Complete quarterly monitoring of gas vents as described in Section 3.0 of Part 1 of the Site-Wide O&M Plan and as amended by the February 28, 2018 letter from EPA with the subject "Proposed Modification to the Passive Gas Vent and Gas Vent Filter System Inspection, Monitoring and Maintenance Section of the Site-Wide Post Closure Care Operations and Maintenance Plan (May 2015)."
- Complete quarterly post-closure OU-7 and site perimeter real time air monitoring as required by Section 2.2 of the Air Monitoring Plan Operable Unit 7, Avtex Fibers Superfund Site, Front Royal, Virginia, October 2011.
- Complete Annual Settlement Survey (February 2020).
- Complete Annual Mowing (March 2020).
- Submit the Annual Sitewide O&M Report (March 2020).



## 2.4 PROBLEMS ENCOUNTERED AND REMEDIES

No problems were encountered during the reporting period.

## 3.0 GROUNDWATER AND LEACHATE TREATMENT PLANT (GLTP)

### 3.1 ACTIONS TAKEN AND REPORTS PREPARED FOURTH QUARTER 2019

The GLTP operated and discharged to the South Fork Shenandoah River (River) for 92-days from October 1 to December 31, 2019.

#### Discharge Monitoring

Discharge monitoring was completed as required by the July 24, 2014, Virginia Department of Environmental Quality (VADEQ) final Fact Sheet and Applicable or Relevant and Appropriate Requirements (ARARs) for the discharge of effluent from the GLTP. Monthly discharge monitoring included: flow, pH, Total Suspended Solids (TSS), Five Day Biological Oxygen Demand (BOD<sub>5</sub>), and carbon disulfide. The daily maximum and monthly average flow and constituents of concern data are listed in the Discharge Monitoring Reports (DMRs), which were submitted during the fourth quarter of 2019 and summarized below.

Table 1.0 Summary of 4Q19 Monthly Effluent Sampling

	Permitted Limits	October 2019 (month avg/daily max)	November 2019 (month avg/daily max)	December 2019 (month avg/daily max)
Flow(gpd)	0.396 MGD	0.073 / 0.096	0.077 / 0.136	0.065 / 0.073
pH (S.U. range)	6.5 – 9.0	7.22 – 7.91	7.5 – 7.9	7.54 – 8.78
TSS (mg/L)	40 / 130	0.53 / 1.10	<QL / <QL	<QL / <QL
BOD <sub>5</sub> (mg/L)	24 / 64	<QL / <QL	<QL / <QL	<QL / <QL
CS <sub>2</sub> (ug/L)	No limit established. 0.1mg/L action level	<QL	<QL	<QL

\*Where parameters non-detect, the value '0' was used for calculating average and maximum concentrations.

- Flow: Flow during discharge was monitored continuously. Additionally, flow rates for the lift stations, test wells and viscose basins for the months of October, November, and December 2019 are provided in Table 4.1 (**Attachment 4**).
- pH: pH was monitored continuously during the days that discharge occurred. The pH monitoring results for each month of the reporting period were included with the monthly DMRs. The effluent pH was within the range of 6.5 to 9.0 specified in the ARARs.
- TSS: TSS was monitored weekly. The permitted monthly daily average limit for TSS of 40 mg/L and the permitted monthly maximum daily limit of 130 mg/L for TSS were not exceeded during the reporting period. The October 2019, TSS monthly average and daily maximum concentrations were 0.53 mg/L and 1.10 mg/L, respectively.

- BOD<sub>5</sub>: BOD<sub>5</sub> was monitored weekly. The permitted monthly daily average limit for BOD<sub>5</sub> of 24 mg/L and the permitted monthly maximum daily limit of 64 mg/L for BOD<sub>5</sub> were not exceeded during the reporting period.
- Carbon Disulfide: Carbon Disulfide was monitored monthly and no limit is established in the ARARs. The results for the monthly samples collected in the fourth quarter of 2019 were less than the 0.1 mg/L monthly action level specified in the ARARs.

### 3.2 DATA GENERATED DURING FOURTH QUARTER 2019

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Discharge monitoring, rainfall data and flow totals for the lift stations, test wells and viscose basin are contained in **Attachment 4**. DMRs were submitted to the VADEQ and EPA by the tenth of each month.

### 3.3 ACTIONS TO BE TAKEN NEXT PERIOD (JANUARY, FEBRUARY, AND MARCH 2020)

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- Continue operations and maintenance and operate the GLTP.
- Collect GLTP system discharge samples as required per the Site ARARs.

### 3.4 PROBLEMS ENCOUNTERED AND REMEDIES

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- TW#2 transducer – communications ongoing. Replaced Level Troll, still intermittent communications with transducer (October 30 – November 1, 2019)
- Install automated gate opener system at GLTP (November)
- TW#3 communication loss - Reset communications, check all fuses and breakers (December 20, 2019)
- Town utility power outage caused several PLC errors. Multiple power outages/blips to GLTP (December 25, 2019)
- SBR system communications loss/PLC issues. Reload PLC program and troubleshoot. (Ongoing)

## 4.0 OTHER SITE RELATED DOCUMENTS AND ITEMS

### 4.1 ACTIONS TAKEN AND REPORTS PREPARED FOURTH QUARTER 2019

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Quarterly inspections (e.g. seep areas, river berms, gas vents, etc.) and inspection reports completed.

#### Rainfall Data

Table 4.2 (**Attachment 4**) shows that a total of 2.9 inches of precipitation fell on the Site during the fourth quarter of 2019 (October, November, and December 2019). The total precipitation for 2019 was 32.1 inches, representing 81% of the average Site total yearly precipitation (39.6 inches).

### 4.2 ACTIONS TO BE TAKEN NEXT PERIOD

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- Quarterly inspections (e.g. seep areas, river berms, gas vents, etc.) and inspection reports to be completed.



## ATTACHMENTS

- 1 Summary of Monthly Correspondence
- 2 Preliminary Site-Wide Quarterly Inspection (with repairs photo log)
- 3 OU-7 and Site Perimeter Air Monitoring Results
  - a. 3.1 Annual Air Analytical Results Summary Table (Table 1), Data Validation Report, and Laboratory Report
- 4 GLTP Discharge Monitoring and Information
  - a. Table 4.1 – Monthly Flow Totals Avtex Site Lift Stations, Test Wells and Viscose Basin
  - b. Table 4.2 - Site Rainfall Data

## **ATTACHMENT 1**

Summary of Monthly Correspondence

## **ATTACHMENT 1**

### **LIST OF CORRESPONDENCE AND DELIVERABLES FOR THE PERIOD OCTOBER 1, 2019 TO DECEMBER 31, 2019, AVTEX FIBERS SUPERFUND SITE, FRONT ROYAL, VIRGINIA**

#### **FMC to VADEQ**

- October 8, 2019: Submission of Discharge Monitoring Report – September 2019 (submitted to VADEQ and EPA)
- November 6, 2019: Submission of Discharge Monitoring Report – October 2019 (submitted to VADEQ and EPA)
- December 6, 2019: Submission of Discharge Monitoring Report – November 2019 (submitted to VADEQ and EPA)

#### **VADEQ to FMC**

#### **FMC to EPA**

- October 20, 2019: Quarterly Progress Report for the Avtex Fibers Superfund Site for the Period 1 July to 30 September 2019 (submitted to VADEQ and EPA)
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#### **EPA to FMC**

## **ATTACHMENT 2**

Preliminary Site-Wide Quarterly Inspection

## Quarterly Inspection Report

Inspected by: M. Harder / K. Teague

Date: 12-11-2019

Report No.: 2019-09

Areas Inspected: See Map

Questions	Response		Comments and Recommendations
<b>1. Remediation/Restoration Areas</b>			
Is settlement or standing water evident? If Yes, describe the degree of settlement(s) (slight, moderate, significant), record approximate dimensions, and indicate the location(s) on an attached map.	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Slight to moderate settlement in small/isolated areas. Several are slated for repairs per the approved workplan. No standing water present.
Is erosion evident? If Yes, describe the type of erosion (rills, gullies), record approximate dimensions (length, width, depth) and indicate location(s) on an attached map.	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
Are potential leachate seeps evident or migration of contamination? If Yes, describe the nature (size, color, flow rate), record location on an attached map, and photograph.  [Note: Check former seep areas in unnamed tributary north of VB 4-6, check pond area north of VB 9, and check other likely areas (e.g., embankments of VBs, SBs)]	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	See map for locations. Potential seeps: -SE of VB-2&3 (Dry) -NW of VB-7&8 (Dry)
Do landfill/basin embankments show signs of erosion, failure (e.g., cracking, sloughing) or migration of contamination (e.g., seeps, exposed waste)? If Yes, describe the nature (type, size), record location on an attached map, and photograph  [Note: Check river-side of embankments along river, if safe to do so.]	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
Is vegetation distressed or are bare areas evident? If Yes, describe the type of disorder (distressed, sparsely vegetated, bare), record approximate dimensions and indicate location(s) on an attached map.	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Isolated/minor bare areas noted. See map for locations. With few exceptions, vegetation is filling in.

## Quarterly Inspection Report

Inspected by: M. Harder / K. Teague

Date: 12-11-2019

Report No.: 2019-09

Areas Inspected: See Map

Questions	Response		Comments and Recommendations
Is there woody vegetation greater than 2 inches in diameter or 5 feet in height on the cover system(s)? If Yes, describe where and actions to be taken (refer to Section 4.2 of the O&M Plan).	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
Is any other damage evident? If Yes, describe the type of damage(s) and indicate the location(s) on an attached map.	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
Are obstruction(s) (brush, debris, timber, leaves, sediment) interfering with the proper functioning of ditches, gutters or flumes? If Yes, describe the type(s) of obstruction(s) and indicate the location(s) on an attached map.	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Minor obstructions at one location: Sediment building up at end of culvert southeast of VB-10 causing standing water in culvert. Issue to be monitored and added to maintenance list.
Is sediment deposited in diversion berms, ditches gutters, flumes or culverts deeper than ¼ of the original channel depth (shown on the contract drawings) or culvert diameter? If Yes, record approximate dimensions and indicate locations on an attached map.	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	



## Quarterly Inspection Report

Inspected by: M. Harder / K. Teague

Date: 12-11-2019

Report No.: 2019-09

Areas Inspected: See Map

Questions

Response

Comments and Recommendations

### 2. Surface Water Drainage and Erosion Control System

<p>Is erosion evident? If Yes, describe the drainage structure inspected (ditch, gutter, flume, culvert, outfall, rip-rap), the type of erosion (rills, gullies, washouts, slope failure), record approximate dimensions (length, width, depth) and indicate location(s) on an attached map.</p>	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<p>Minor erosion noted in a few isolated areas. See map for locations. Rills forming across access road to LS-1 (west of VB-4, 5, &amp; 6). Rills have also formed on north bank of the sediment basin between the NLF and VB-2&amp;3. Roadway southwest of VB-10 remains in good shape since repairs.</p>
<p>Is overall shape, configuration, and alignment of the drainageway as shown on the drawings? If No, describe the type of distortion (damaged, eroded, slope failure), record approximate dimensions and indicate location(s) on an attached map.</p>	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
<p>Is erosion evident at drainage outlet aprons? If Yes, record approximate dimensions and indicate location(s) on an attached map.</p>	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	

Inspection Checklist (check items that were inspected; document concerns noted;  
refer to attached Drawings for specific areas)

**Viscos Basins 1-3**

<input checked="" type="checkbox"/> Vegetation	<input checked="" type="checkbox"/> Erosion	<input checked="" type="checkbox"/> Settlement	<input checked="" type="checkbox"/> Gas Vents
<input checked="" type="checkbox"/> Culvert Inlets & outlets	<input checked="" type="checkbox"/> Rip-rap channels	<input checked="" type="checkbox"/> Access road near unit	<input type="checkbox"/>

**Viscos Basins 4-6**

<input checked="" type="checkbox"/> Vegetation	<input checked="" type="checkbox"/> Erosion	<input checked="" type="checkbox"/> Settlement	<input checked="" type="checkbox"/> Gas Vents
<input checked="" type="checkbox"/> Culvert Inlets & outlets - N, E, & W of VB 4-6; - Pond W of VB 4-6	<input checked="" type="checkbox"/> Rip-rap channels	<input checked="" type="checkbox"/> Down chutes	<input checked="" type="checkbox"/> Gas Vent Filter & Fence
<input checked="" type="checkbox"/> Former seep area - N of VB 4-6	<input checked="" type="checkbox"/> LS #1 & #2 and Fencing	<input checked="" type="checkbox"/> Access road near unit	<input type="checkbox"/>

**Viscos Basins 7-8**

<input checked="" type="checkbox"/> Vegetation	<input checked="" type="checkbox"/> Erosion	<input checked="" type="checkbox"/> Settlement	<input checked="" type="checkbox"/> Gas Vents
<input checked="" type="checkbox"/> Culvert Inlets & outlets (between VB-1 and VB-7)	<input checked="" type="checkbox"/> Rip-rap channels	<input checked="" type="checkbox"/> Down chutes	<input checked="" type="checkbox"/> Leachate Collection Manhole (MW VB7)
<input checked="" type="checkbox"/> Access road near unit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Viscos Basins 9-11**

<input checked="" type="checkbox"/> Vegetation	<input checked="" type="checkbox"/> Erosion	<input checked="" type="checkbox"/> Settlement	<input checked="" type="checkbox"/> Gas Vents
<input checked="" type="checkbox"/> Drop inlets on VB-11	<input checked="" type="checkbox"/> Culver inlets & outlets (S&W VB-11; N VB-11 & VB-9; and SW VB-10)	<input checked="" type="checkbox"/> Rip-rap channels	<input checked="" type="checkbox"/> Down chutes
<input checked="" type="checkbox"/> Access road near unit	<input checked="" type="checkbox"/> Seep area in pond north of VB-9	<input checked="" type="checkbox"/> VB 9-11 fence and gates	<input checked="" type="checkbox"/> LS #4 and Fencing

**New Landfill**

<input checked="" type="checkbox"/> Vegetation	<input checked="" type="checkbox"/> Erosion	<input checked="" type="checkbox"/> Settlement	<input checked="" type="checkbox"/> Gas Vents
<input checked="" type="checkbox"/> Culvert inlets & outlets (NE & SE of NLF)	<input checked="" type="checkbox"/> Rip-rap channels	<input checked="" type="checkbox"/> Down chutes	<input checked="" type="checkbox"/> LS #3 and Fencing
<input checked="" type="checkbox"/> Access road near unit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**SB-1**

<input checked="" type="checkbox"/> Vegetation	<input checked="" type="checkbox"/> Erosion	<input checked="" type="checkbox"/> Settlement	<input checked="" type="checkbox"/> Gas Vents
<input checked="" type="checkbox"/> Culvert inlets & outlets (NE SB-1; SB-2; SE SB-3; NE SB-4; & S SB-4)	<input checked="" type="checkbox"/> Rip-rap channels & outlets by River	<input checked="" type="checkbox"/> Down chutes (SB-1 & SB-4)	<input type="checkbox"/>
<input checked="" type="checkbox"/> Access road near unit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Inspection Checklist (check items that were inspected; document concerns noted;  
refer to attached Drawings for specific areas)

**SB-2**

<input checked="" type="checkbox"/> Vegetation	<input checked="" type="checkbox"/> Erosion	<input checked="" type="checkbox"/> Settlement	<input checked="" type="checkbox"/> Culvert inlets & Outlets (S & W Sides)
<input checked="" type="checkbox"/> Berms along River (site & river side)	<input checked="" type="checkbox"/> Rip-rap channels & outlets by River	<input checked="" type="checkbox"/> Access road near unit	<input type="checkbox"/>

**SB-3**

<input checked="" type="checkbox"/> Vegetation	<input checked="" type="checkbox"/> Erosion	<input checked="" type="checkbox"/> Settlement	<input checked="" type="checkbox"/> Gas Vents
<input checked="" type="checkbox"/> Culvert inlets & Outlets (SE))	<input checked="" type="checkbox"/> Rip-rap channels & outlets by River	<input checked="" type="checkbox"/> Drop inlets (W side)	<input checked="" type="checkbox"/> Access Road near unit
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**SB-4**

<input checked="" type="checkbox"/> Vegetation	<input checked="" type="checkbox"/> Erosion	<input checked="" type="checkbox"/> Settlement	<input checked="" type="checkbox"/> Gas Vents
<input checked="" type="checkbox"/> Culvert inlets & outlets (NE & S sides)	<input checked="" type="checkbox"/> Down chutes (S Side)	<input checked="" type="checkbox"/> Drop inlet (N side)	<input checked="" type="checkbox"/> Berms along River (site & river side)
<input checked="" type="checkbox"/> Access road near unit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**SB-5**

<input checked="" type="checkbox"/> Vegetation	<input checked="" type="checkbox"/> Erosion	<input checked="" type="checkbox"/> Settlement	<input checked="" type="checkbox"/> Gas Vents
<input checked="" type="checkbox"/> Berms along River and E side	<input checked="" type="checkbox"/> Access Road near unit	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**FAB 1-3**

<input checked="" type="checkbox"/> Vegetation	<input checked="" type="checkbox"/> Erosion	<input checked="" type="checkbox"/> Settlement	<input checked="" type="checkbox"/> Culvert inlets & outlets (E & S FAB1-2; SW FAB3)
<input checked="" type="checkbox"/> Access Road near unit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**FAS & FARA**

<input checked="" type="checkbox"/> Vegetation	<input checked="" type="checkbox"/> Erosion	<input checked="" type="checkbox"/> Settlement	<input checked="" type="checkbox"/> Culvert inlets & outlets (E & N FAS; E FARA)
<input checked="" type="checkbox"/> Access Road near unit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**EL, PB 1-2, PB-3**

<input checked="" type="checkbox"/> Vegetation	<input checked="" type="checkbox"/> Erosion	<input checked="" type="checkbox"/> Settlement	<input checked="" type="checkbox"/> Rip-rap Channels
<input checked="" type="checkbox"/> Culvert inlets & outlets (E & W EL; NW PB-1-2; S PB-3)	<input checked="" type="checkbox"/> Access Road near unit	<input type="checkbox"/>	<input type="checkbox"/>

**Quarterly Inspection Report Photographic Log**  
**Avtex Superfund Site**  
**Front Royal, Virginia**

**Photo Number:** 1

**Unit:** OU-10

**Basin/Landfill:**

VB-4, 5, & 6

**Date :** 12/11/2019



**Photo Description:** Two 20' x 40' areas of former standing water adjacent to LS-2 (Dry).

**Photo Number:** 2

**Unit:** OU-10

**Basin/Landfill:**

VB-4, 5, & 6

**Date :** 12/11/2019



**Photo Description:** Rills forming on access road to LS-1 west of VB-4, 5, & 6.



**Quarterly Inspection Report Photographic Log**  
**Avtex Superfund Site**  
**Front Royal, Virginia**

**Photo Number:** 3

**Unit:** OU-10

**Basin/Landfill:**

VB-2&3, and NLF

**Date :** 12/11/2019



**Photo Description:** Former area of standing water southeast of VB-2&3.

**Photo Number:** 4

**Unit:** OU-10

**Basin/Landfill:**

VB-2&3, and NLF

**Date :** 12/11/2019



**Photo Description:** Bare soil (~10' x30') with rills southeast of VB-2&3 (Sediment basin between NLF and VB-2&3). Stable.



**Quarterly Inspection Report Photographic Log**  
**Avtex Superfund Site**  
**Front Royal, Virginia**



**Photo Number:** 5

**Unit:** OU-7

**Basin/Landfill:**

VB-9, 10, & 11

**Date :** 12/11/2019

**Photo Description:** Area around wells 103/203/303 – small area of standing water.



**Photo Number:** 6

**Unit:** OU-7

**Basin/Landfill:**

VB-10

**Date :** 12/11/2019

**Photo Description:** Sediment building up at end of culvert under access road.



**Quarterly Inspection Report Photographic Log**  
**Avtex Superfund Site**  
**Front Royal, Virginia**

**Photo Number:** 7

**Unit:** OU-7

**Basin/Landfill:**

VB-10

**Date :** 12/11/2019



**Photo Description:** Bare patches and exposed matting at down chute in south side of VB-10.

**Photo Number:** 8

**Unit:** OU-7

**Basin/Landfill:**

VB-10

**Date :** 12/11/2019



**Photo Description:** Bare patches and exposed matting at down chute on south side of VB-10.

**Quarterly Inspection Report Photographic Log**  
**Avtex Superfund Site**  
**Front Royal, Virginia**

**Photo Number:** 9

**Unit:** OU-7

**Basin/Landfill:**

VB-10

**Date :** 12/11/2019



**Photo Description:** Settlement in southwest section of VB-10 (30' x 30') – prepared or repairs.

**Photo Number:** 10

**Unit:** OU-7

**Basin/Landfill:**

VB-9

**Date :** 12/11/2019



**Photo Description:** Settlement on previously repaired areas on VB-9 (30' x 40 each)- prepared for repairs.



**Quarterly Inspection Report Photographic Log**  
**Avtex Superfund Site**  
**Front Royal, Virginia**

**Photo Number:** 11

**Unit:** NTCRA Basins

**Basin/Landfill:**

SB-1

**Date :** 12/11/2019



**Photo Description:** Area of settlement (20'x40') in front of northernmost inlet between SB-3 and SB-2 (now dry) – prepared for repairs.

**Photo Number:** 12

**Unit:** NTCRA Basins

**Basin/Landfill:**

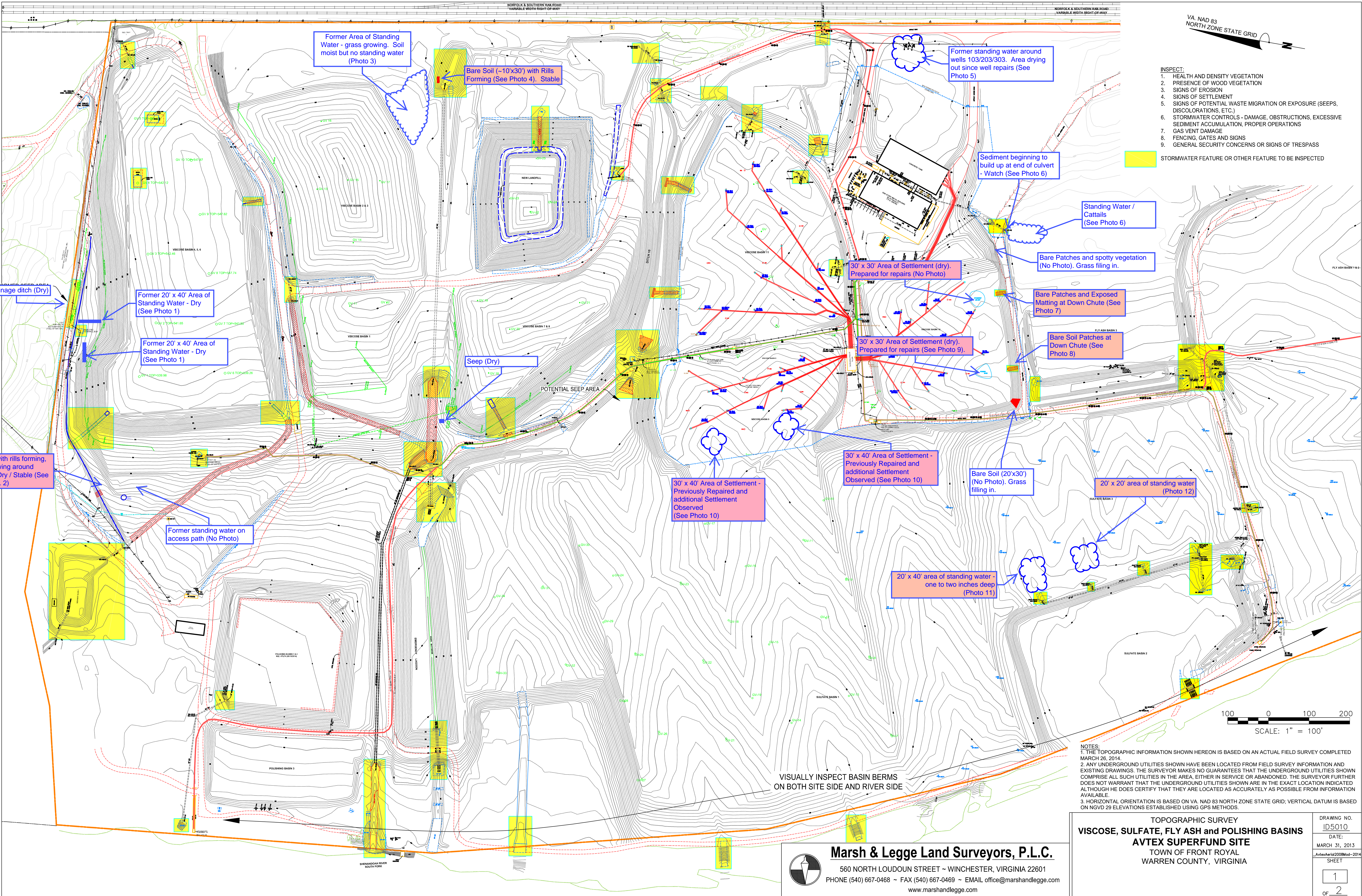
SB-1

**Date :** 12/11/2019

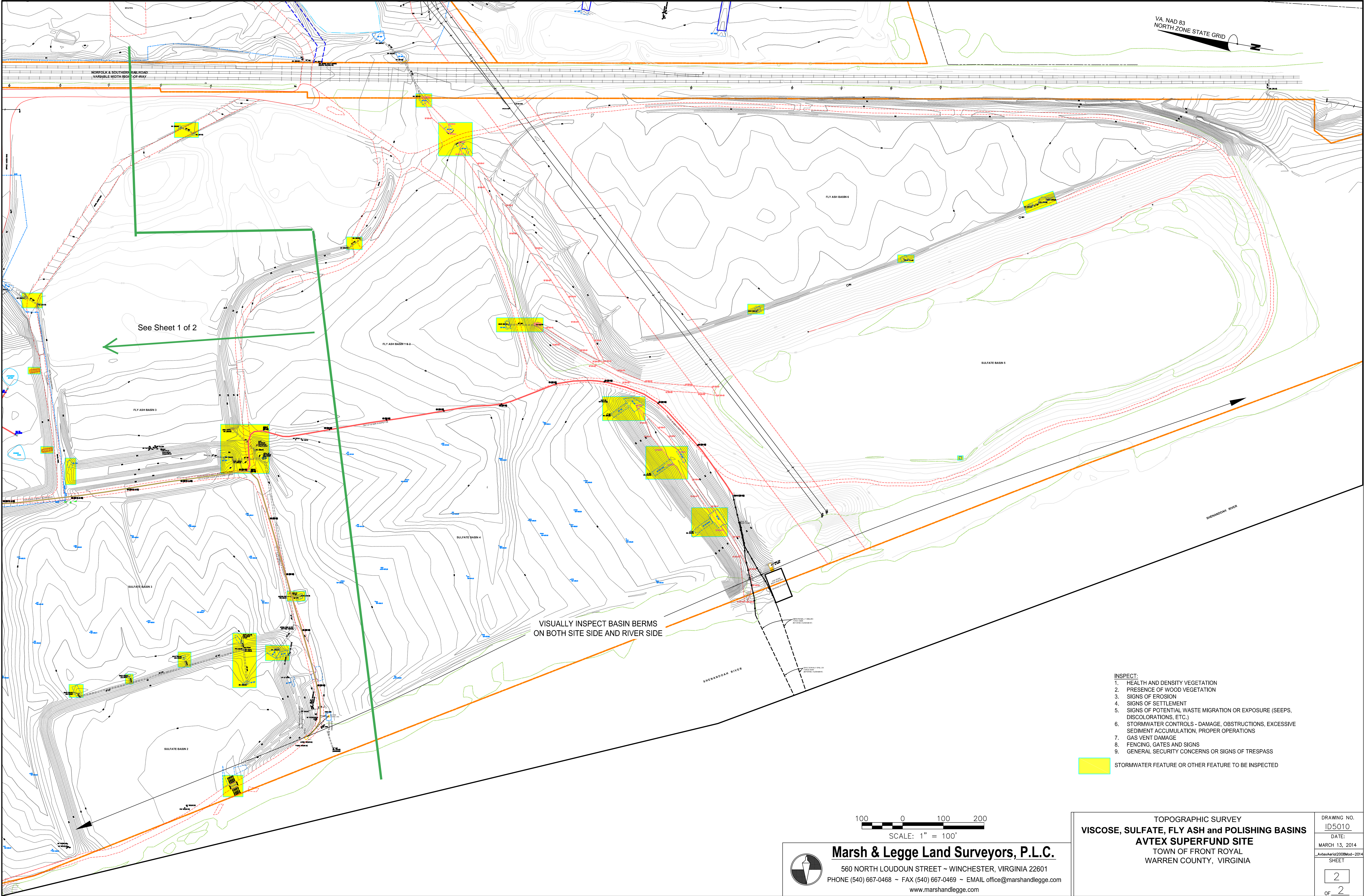


**Photo Description:** Area of settlement (20'x20') in front of the second to northernmost inlet between SB-3 and SB-2 (dry) – prepared for repairs.





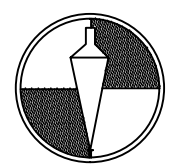




- INSPECT:
1. HEALTH AND DENSITY VEGETATION
  2. PRESENCE OF WOOD VEGETATION
  3. SIGNS OF EROSION
  4. SIGNS OF SETTLEMENT
  5. SIGNS OF POTENTIAL WASTE MIGRATION OR EXPOSURE (SEEPS, DISCOLORATIONS, ETC.)
  6. STORMWATER CONTROLS - DAMAGE, OBSTRUCTIONS, EXCESSIVE SEDIMENT ACCUMULATION, PROPER OPERATIONS
  7. GAS VENT DAMAGE
  8. FENCING, GATES AND SIGNS
  9. GENERAL SECURITY CONCERNS OR SIGNS OF TRESPASS

STORMWATER FEATURE OR OTHER FEATURE TO BE INSPECTED

100 0 100 200  
SCALE: 1" = 100'



**Marsh & Legge Land Surveyors, P.L.C.**  
560 NORTH LOUDOUN STREET ~ WINCHESTER, VIRGINIA 22601  
PHONE (540) 667-0468 ~ FAX (540) 667-0469 ~ EMAIL office@marshandlegge.com  
www.marshandlegge.com

TOPOGRAPHIC SURVEY  
**VISCOSE, SULFATE, FLY ASH and POLISHING BASINS**  
**AVTEX SUPERFUND SITE**  
TOWN OF FRONT ROYAL  
WARREN COUNTY, VIRGINIA

DRAWING NO.  
**ID5010**  
DATE:  
MARCH 13, 2014  
Avtex/Heris2008Mod-2014  
SHEET  
**2**  
OF **2**



## **ATTACHMENT 3**

OU-7 and Site Perimeter Air Monitoring Results  
3.1 Annual Air Analytical Results Summary Table (Table 1),  
Data Validation Report, and Laboratory Report

Air Monitoring Form  
Avtex Superfund Site  
Front Royal, Virginia

Date 12/11/2019  
Technician M. Harder / K. Teague

Air Samples Collected?

☐ Yes  
☒ No

Gas Monitoring Devices	Used (Y/N)	Calibrated (Y/N)	Date Calibrated	Initials
Jerome613X (low-level H <sub>2</sub> S)	Y	Y	2/1/2019	MH
MiniRae 3000 (PID)	Y	Y	12/11/2019	MH
MultiRae (PID, O <sub>2</sub> , CO, H <sub>2</sub> S, LEL)	N	N		
Landtec GEM 5000	N	N		

Weather Conditions:

Precipitation (Current): ☐ Rain ☐ Snow ☐ Sleet ☐ Mix ☐ Other ☒ None  
☐ Light ☐ Moderate ☐ Heavy

Current Temperature: 36 °F

Wind Direction (blowing from): W (N, NE, SW, variable, etc.)

Wind Speed: 7 mph

Barometric Pressure: 30.43 inches

Cloud Cover: ☒ Clear ☐ Partly Cloudy ☐ Mostly Cloudy ☐ Cloudy/Overcast ☐ Foggy

Monitoring Location	Time	H <sub>2</sub> S (ppm)	Organic / VOC (ppm)	CS <sub>2</sub> (ppm)	Methane (%LEL)	Comments
OU-7 Perimeter - (H <sub>2</sub> S Indicator Value = 0.006 ppm)						
N	1610	0.000	0.0	--	--	
NE	1600	0.000	0.0	--	--	
SE	1700	0.001	0.0	--	--	
S	1645	0.000	0.0	--	--	
SW	1630	0.001	0.0	--	--	
NW	1620	0.000	0.0	--	--	
Site Perimeter - (H <sub>2</sub> S Indicator Value = 0.0014 ppm)						
N	1450	0.000	0.0	--	--	
NE	1400	0.000	0.0	--	--	
E	1415	0.000	0.0	--	--	
SE	1430	0.001	0.0	--	--	
S	1540	0.000	0.0	--	--	
SW	1530	0.001	0.0	--	--	
W	1515	0.000	0.0	--	--	
NW	1500	0.000	0.0	--	--	
Downwind (location: <u>W</u> )	1550	0.001	0.0	--	--	

Activities Occuring on-site that might relate to air emissions:

Groundwater extraction and treatment.

If monitoring results are greater than one or more of above levels & sustained for 1 minute or longer, take following actions:

1. Notify FMC Site Manager, SSO, and EPA/EPA oversight representative;
2. Stop on-site intrusive operations and assess source(s);
3. Step-up work-zone & perimeter monitoring;
4. Perform monitoring the next day to verify levels.

**If H<sub>2</sub>S > 0.1 ppm sustained for 5 minutes at Site Perimeter - Notify Warren County/Front Royal LEPC and Health Department.**

**FIGURE 1**  
**AIR MONITORING LOCATIONS**  
**DURING OU-7 WORK**  
**AVTEX FIBERS SUPERFUND SITE**  
**FRONT ROYAL, VIRGINIA**



# ATTACHMENT 3.1

TABLE 1

Annual Air Sampling Analytical Results Summary  
Avtex Site  
Front Royal, Virginia

Parameters	Units	Sample Location:		OU-7-Perim-N	OU-7-Perim-NE	OU-7-Perim-NE	OU-7-Perim-NW	OU-7-Perim-S	OU-7-Perim-SE	OU-7-Perim-SW
		Sample Date:		9/4/2019	9/4/2019	9/4/2019	9/4/2019	9/4/2019	9/4/2019	9/4/2019
		EPA RSL (HQ=1)		Result	Result	Duplicate Result	Result	Result	Result	Result
		Industrial	Residential							
1-Butanethiol (n-Butyl mercaptan)	ug/m3	--	--	10 U	11 U	10 U	11 U	11 U	10 U	10 U
1-Isobutanethiol	ug/m3	--	--	10 U	11 U	10 U	11 U	11 U	10 U	10 U
1-Propanethiol (Propyl mercaptan)	ug/m3	--	--	8.6 U	8.9 U	8.4 U	9.5 U	9.2 U	8.8 U	8.8 U
2,5-Dimethylthiophene	ug/m3	--	--	13 U	13 U	12 U	14 U	14 U	13 U	13 U
2-Ethylthiophene	ug/m3	--	--	13 U	13 U	12 U	14 U	14 U	13 U	13 U
2-Methyl-2-propanethiol (tert-Butyl mercaptan)	ug/m3	--	--	10 U	11 U	10 U	11 U	11 U	10 U	10 U
2-Propanethiol (Isopropyl mercaptan)	ug/m3	--	--	8.6 U	8.9 U	8.4 U	9.5 U	9.2 U	8.8 U	8.8 U
3-Methylthiophene	ug/m3	--	--	11 U	11 U	11 U	12 U	12 U	11 U	11 U
Carbon disulfide	ug/m3	3100	730	7.7 J	9.2 J	13 J	4.7 U	7.1 J	9.8 J	26
Carbonyl sulfide	ug/m3	4400	100	6.4 U	6.7 U	8.7 J	7.1 U	6.9 U	6.6 U	10 J
Diethyl disulfide	ug/m3	--	--	14 U	14 U	13 U	15 U	15 U	14 U	14 U
Diethyl sulfide	ug/m3	--	--	10 U	11 U	10 U	11 U	11 U	10 U	10 U
Ethyl mercaptan	ug/m3	--	--	7.0 U	7.3 U	6.9 U	7.7 U	7.5 U	7.2 U	7.2 U
Hydrogen sulfide	ug/m3	8.8	2.1	2.9 U	3.0 U	2.8 U	3.2 U	5.7 J	4.3 J	2.9 U
Methyl disulfide	ug/m3	--	--	5.3 U	5.5 U	140	5.9 U	5.7 U	5.4 U	5.4 U
Methyl ethyl sulfide	ug/m3	--	--	8.6 U	8.9 U	8.4 U	9.5 U	9.2 U	8.8 U	8.8 U
Methyl mercaptan	ug/m3	--	--	5.4 U	5.6 U	5.3 U	6.0 U	5.8 U	5.5 U	5.5 U
Methyl sulfide	ug/m3	--	--	7.0 U	7.3 U	9.3 J	7.7 U	7.5 U	7.2 U	7.2 U
Tetrahydro-Thiophene (Thiophane)	ug/m3	--	--	9.9 U	10 U	9.7 U	11 U	11 U	10 U	10 U
Thiophene	ug/m3	--	--	9.5 U	9.8 U	9.3 U	10 U	10 U	9.7 U	9.7 U

Footnotes:

U = Not detected at the associated reporting limit.

J = Estimated concentration.

Highlighted results exceed screening criteria

RSL = Regional Screening Level



TABLE 1

Annual Air Sampling Analytical Results Summary  
Avtex Site  
Front Royal, Virginia

Parameters	Units	Sample Location:		PERIM-DOWNWIND (NNE)	PERIM-E	PERIM-N	PERIM-N	PERIM-NE	PERIM-NW	PERIM-S	PERIM-SE	PERIM-SW	PERIM-W
		Sample Date:		9/4/2019	9/4/2019	9/4/2019	9/4/2019	9/4/2019	9/4/2019	9/4/2019	9/4/2019	9/4/2019	9/4/2019
		EPA RSL (HQ=1)		Result	Result	Result	Duplicate Result	Result	Result	Result	Result	Result	Result
		Industrial	Residential										
1-Butanethiol (n-Butyl mercaptan)	ug/m3	--	--	11 U	12 U	12 U	10 U	10 U	11 U	11 U	11 U	11 U	11 U
1-Isobutanethiol	ug/m3	--	--	11 U	12 U	12 U	10 U	10 U	11 U	11 U	11 U	11 U	11 U
1-Propanethiol (Propyl mercaptan)	ug/m3	--	--	9.0 U	9.8 U	9.7 U	8.8 U	8.8 U	9.2 U	8.9 U	9.0 U	9.2 U	8.9 U
2,5-Dimethylthiophene	ug/m3	--	--	13 U	14 U	14 U	13 U	13 U	13 U	13 U	13 U	13 U	13 U
2-Ethylthiophene	ug/m3	--	--	13 U	14 U	14 U	13 U	13 U	13 U	13 U	13 U	13 U	13 U
2-Methyl-2-propanethiol (tert-Butyl mercaptan)	ug/m3	--	--	11 U	12 U	12 U	10 U	10 U	11 U	11 U	11 U	11 U	11 U
2-Propanethiol (Isopropyl mercaptan)	ug/m3	--	--	9.0 U	9.8 U	9.7 U	8.8 U	8.8 U	9.2 U	8.9 U	9.0 U	9.2 U	8.9 U
3-Methylthiophene	ug/m3	--	--	12 U	23 J	13 U	11 U	11 U	12 U	11 U	12 U	12 U	11 U
Carbon disulfide	ug/m3	3100	730	11 J	430	31 J	12 J	26	4.6 U	4.5 U	6.5 J	6.4 J	22
Carbonyl sulfide	ug/m3	4400	100	6.8 U	42	22	6.6 U	11 J	6.9 U	6.7 U	6.7 U	6.9 U	6.7 U
Diethyl disulfide	ug/m3	--	--	14 U	16 U	16 U	14 U	14 U	15 U	14 U	14 U	15 U	14 U
Diethyl sulfide	ug/m3	--	--	11 U	12 U	12 U	10 U	10 U	11 U	11 U	11 U	11 U	11 U
Ethyl mercaptan	ug/m3	--	--	7.4 U	8.0 U	7.9 U	7.2 U	7.2 U	7.5 U	7.3 U	7.3 U	7.5 U	7.3 U
Hydrogen sulfide	ug/m3	8.8	2.1	3.0 U	15	3.3 U	3.0 U	2.9 U	3.1 U	3.0 U	3.0 U	3.1 U	7.6 J
Methyl disulfide	ug/m3	--	--	5.6 U	8.9 J	6.0 U	5.5 U	5.4 U	5.7 U	5.5 U	5.5 U	5.7 U	5.5 U
Methyl ethyl sulfide	ug/m3	--	--	9.0 U	9.8 U	9.7 U	8.8 U	8.8 U	9.2 U	8.9 U	9.0 U	9.2 U	8.9 U
Methyl mercaptan	ug/m3	--	--	5.7 U	11 J	6.1 U	5.6 U	5.5 U	5.8 U	5.6 U	5.7 U	5.8 U	5.6 U
Methyl sulfide	ug/m3	--	--	7.4 U	8.0 U	7.9 U	7.2 U	7.2 U	7.5 U	7.3 U	7.3 U	7.5 U	7.3 U
Tetrahydro-Thiophene (Thiophane)	ug/m3	--	--	10 U	11 U	11 U	10 U	10 U	11 U	10 U	10 U	11 U	10 U
Thiophene	ug/m3	--	--	10 U	24 J	11 U	9.8 U	9.7 U	10 U	9.8 U	9.9 U	10 U	9.8 U

## Footnotes:

U = Not detected at the associated reporting limit.

J = Estimated concentration.

Highlighted results exceed screening criteria

RSL = Regional Screening Level





# Memorandum

November 27, 2019

To: Michael Robinson [michael.robinson@parsons.com]

Ref. No.: 11119510-001

From: Kathy Willy/adh/24

Tel: 716-205-1942

CC: Deb Andrasko

**Subject: Analytical Results and Full Validation  
Annual Air Monitoring  
FMC Avtex Fibers Superfund Site  
Front Royal, Virginia  
September 2019**

## 1. Introduction

This document details a validation of analytical results for air samples collected in support of the Annual Air Monitoring at the Avtex Fibers Superfund site during September 2019. Samples were submitted to ALS Laboratory located in Simi Valley, California. A sample collection and analysis summary is presented in Table 1. The validated analytical results are summarized in Table 2. A summary of the analytical methodology is presented in Table 3.

Full Contract Laboratory Program (CLP) equivalent raw data deliverables were provided by the laboratory. Evaluation of the data was based on information obtained from the finished data sheets, raw data, chain of custody forms, calibration data, blank data, duplicate data, recovery data from laboratory control samples (LCS) samples, and field quality assurance/quality control (QA/QC) samples. The assessment of analytical and in-house data included checks for: data consistency (by observing comparability of duplicate analyses), adherence to accuracy and precision criteria, and transmittal errors.

The QA/QC criteria by which these data have been assessed are outlined in the analytical method referenced in Table 3 and applicable guidance from the document entitled "National Functional Guidelines for Organic Data Review", United States Environmental Protection Agency (USEPA) 540-R-2016-002, September 2016, subsequently referred to as the "Guidelines" in this Memorandum.

## 2. Sample Holding Time and Preservation

The sample holding time criterion for the analysis is summarized in Table 3. Sample chain of custody documents and analytical reports were used to determine sample holding times. All samples were analyzed within the required holding times.

All samples were properly delivered and stored by the laboratory.



### 3. Initial Calibration - Gas Chromatograph

In order to quantify organic compounds of interest by gas chromatograph (GC), calibration of the GC over a specific concentration range must be performed. Initially, a calibration curve consisting of a minimum of five concentration levels is analyzed for the method recommended sulfur compounds. Linearity of the calibration curve is acceptable if all relative standard deviation (RSD) values are less than or equal to 25.0 percent.

A retention time standard is analyzed during the initial calibration to identify the target compounds and establish retention time windows. These retention times are then used to identify all compounds of interest in subsequent analyses.

All initial calibration standards were analyzed at the required frequencies. All retention time windows and linearity criteria were satisfied as specified in the method.

### 4. Continuing Calibration - Gas Chromatograph

To ensure that the calibration of the instrument for organic analyses by GC is valid throughout the sample analysis period, continuing calibration standards are analyzed and evaluated on a regular basis. To evaluate the continued linearity of the calibration, percent difference (%D) values are calculated and should not exceed 30 percent.

All continuing calibration standards were analyzed at the required frequency. All %D values and compound retention times met the above criteria, indicating acceptable instrument calibration throughout the analysis period.

### 5. Laboratory Blank Analyses

Method blanks are prepared from a purified matrix and analyzed with investigative samples to determine the existence and magnitude of sample contamination introduced during the analytical procedures.

For this study, laboratory method blanks were analyzed at a minimum frequency of 1 per 20 investigative samples and/or 1 per analytical batch.

All method blank results were non-detect, indicating that laboratory contamination was not a factor for this investigation.

### 6. Laboratory Control Sample Analyses

LCS are prepared and analyzed as samples to assess the analytical efficiencies of the method employed, independent of sample matrix effects.

For this study, LCS were analyzed at a minimum frequency of 1 per 20 investigative samples and/or 1 per analytical batch.



The LCS contained the method recommended compounds. All LCS recoveries were within the laboratory control limits, demonstrating acceptable analytical accuracy and precision.

## 7. Field QA/QC Samples

The field QA/QC consisted of two field duplicate sample sets.

To assess the analytical and sampling protocol precision, two field duplicate sample sets were collected and submitted "blind" to the laboratory, as specified in Table 1. The relative percent differences (RPDs) associated with these duplicate samples must be less than 25 percent for air samples. If the reported concentration in either the investigative sample or its duplicate is less than five times the reporting limit (RL), the evaluation criterion is one times the RL value for air samples.

All field duplicate results showed adequate reproducibility, indicating satisfactory sampling and laboratory precision with the exception of the carbon disulfide results in both field duplicate sample sets. The results for the original and duplicate samples were qualified as estimated to reflect the indicated variability. A summary of the qualified results is presented in Table 4.

## 8. Analyte Reporting

The laboratory reported detected results down to the laboratory's RL for each analyte. Positive analyte detections less than the RL but greater than the Method Detection Limit (MDL) were reported as estimated (J) in Table 2 unless qualified otherwise in this memorandum. Non-detect results were presented as non-detect at the RL in Table 2.

## 9. Target Compound Identification

To minimize erroneous compound identification during organic analyses, qualitative criteria including compound retention time were evaluated according to the identification criteria established by the method. The samples identified in Table 1 were reviewed. The compounds reported adhered to the specified identification criteria.

## 10. Conclusion

Based on the assessment detailed in the foregoing, the data summarized in Table 2 are acceptable with the specific qualifications noted herein.

Table 1

**Sample Collection and Analysis Summary**  
**Annual Air Monitoring**  
**FMC Avtex Fibers Superfund Site**  
**Front Royal, Virginia**  
**September 2019**

Sample Identification	Location	Matrix	Collection Date (mm/dd/yyyy)	Collection Time (hr:min)	Analysis	Comments
					Sulfur Compounds (air)	
OU-7-N	OU-7-Perim-N	Air	09/04/2019	14:38	X	
OU-7-NE	OU-7-Perim-NE	Air	09/04/2019	14:33	X	
DUP1-090319	OU-7-Perim-NE	Air	09/04/2019	14:35	X	Field duplicate of sample OU-7-NE
OU-7-NW	OU-7-Perim-NW	Air	09/04/2019	14:41	X	
OU-7-S	OU-7-Perim-S	Air	09/04/2019	14:48	X	
OU-7-SE	OU-7-Perim-SE	Air	09/04/2019	15:36	X	
OU-7-SW	OU-7-Perim-SW	Air	09/04/2019	14:45	X	
P-DOWN-NNE	PERIM-DOWNWIND (NNE)	Air	09/04/2019	14:55	X	
P-E	PERIM-E	Air	09/04/2019	15:25	X	
P-N	PERIM-N	Air	09/04/2019	14:59	X	
DUP2-090319	PERIM-N	Air	09/04/2019	15:04	X	Field duplicate of sample P-N
P-NE	PERIM-NE	Air	09/04/2019	15:29	X	
P-NW	PERIM-NW	Air	09/04/2019	15:06	X	
P-S	PERIM-S	Air	09/04/2019	15:18	X	
P-SE	PERIM-SE	Air	09/04/2019	15:33	X	
P-SW	PERIM-SW	Air	09/04/2019	15:15	X	
P-W	PERIM-W	Air	09/04/2019	15:10	X	

Table 2

**Analytical Results Summary  
Annual Air Monitoring  
FMC Avtex Fibers Superfund Site  
Front Royal, Virginia  
September 2019**

Location ID: Sample Name: Sample Date:		OU-7-Perim-N OU-7-N 09/04/2019	OU-7-Perim-NE OU-7-NE 09/04/2019	OU-7-Perim-NE DUP1-090319 09/04/2019 Duplicate	OU-7-Perim-NW OU-7-NW 09/04/2019	OU-7-Perim-S OU-7-S 09/04/2019	OU-7-Perim-SE OU-7-SE 09/04/2019
Parameters	Unit						
<b>General Chemistry</b>							
1-Butanethiol (n-Butyl mercaptan)	µg/m3	10 U	11 U	10 U	11 U	11 U	10 U
1-Isobutanethiol	µg/m3	10 U	11 U	10 U	11 U	11 U	10 U
1-Propanethiol (Propyl mercaptan)	µg/m3	8.6 U	8.9 U	8.4 U	9.5 U	9.2 U	8.8 U
2,5-Dimethylthiophene	µg/m3	13 U	13 U	12 U	14 U	14 U	13 U
2-Ethylthiophene	µg/m3	13 U	13 U	12 U	14 U	14 U	13 U
2-Methyl-2-propanethiol (tert-Butyl mercaptan)	µg/m3	10 U	11 U	10 U	11 U	11 U	10 U
2-Propanethiol (Isopropyl mercaptan)	µg/m3	8.6 U	8.9 U	8.4 U	9.5 U	9.2 U	8.8 U
3-Methylthiophene	µg/m3	11 U	11 U	11 U	12 U	12 U	11 U
Carbon disulfide	µg/m3	7.7 J	9.2 J	13 J	4.7 U	7.1 J	9.8 J
Carbonyl sulfide	µg/m3	6.4 U	6.7 U	8.7 J	7.1 U	6.9 U	6.6 U
Diethyl disulfide	µg/m3	14 U	14 U	13 U	15 U	15 U	14 U
Diethyl sulfide	µg/m3	10 U	11 U	10 U	11 U	11 U	10 U
Ethyl mercaptan	µg/m3	7.0 U	7.3 U	6.9 U	7.7 U	7.5 U	7.2 U
Hydrogen sulfide	µg/m3	2.9 U	3.0 U	2.8 U	3.2 U	5.7 J	4.3 J
Methyl disulfide	µg/m3	5.3 U	5.5 U	140	5.9 U	5.7 U	5.4 U
Methyl ethyl sulfide	µg/m3	8.6 U	8.9 U	8.4 U	9.5 U	9.2 U	8.8 U
Methyl mercaptan	µg/m3	5.4 U	5.6 U	5.3 U	6.0 U	5.8 U	5.5 U
Methyl sulfide	µg/m3	7.0 U	7.3 U	9.3 J	7.7 U	7.5 U	7.2 U
Tetrahydro-Thiophene (Thiophane)	µg/m3	9.9 U	10 U	9.7 U	11 U	11 U	10 U
Thiophene	µg/m3	9.5 U	9.8 U	9.3 U	10 U	10 U	9.7 U

Table 2

**Analytical Results Summary  
Annual Air Monitoring  
FMC Avtex Fibers Superfund Site  
Front Royal, Virginia  
September 2019**

Location ID: Sample Name: Sample Date:		OU-7-Perim-SW OU-7-SW 09/04/2019	PERIM-DOWNWIND (NNE) P-DOWN-NNE 09/04/2019	PERIM-E P-E 09/04/2019	PERIM-N P-N 09/04/2019	PERIM-N DUP2-090319 09/04/2019 Duplicate
Parameters	Unit					
<b>General Chemistry</b>						
1-Butanethiol (n-Butyl mercaptan)	µg/m3	10 U	11 U	12 U	12 U	10 U
1-Isobutanethiol	µg/m3	10 U	11 U	12 U	12 U	10 U
1-Propanethiol (Propyl mercaptan)	µg/m3	8.8 U	9.0 U	9.8 U	9.7 U	8.8 U
2,5-Dimethylthiophene	µg/m3	13 U	13 U	14 U	14 U	13 U
2-Ethylthiophene	µg/m3	13 U	13 U	14 U	14 U	13 U
2-Methyl-2-propanethiol (tert-Butyl mercaptan)	µg/m3	10 U	11 U	12 U	12 U	10 U
2-Propanethiol (Isopropyl mercaptan)	µg/m3	8.8 U	9.0 U	9.8 U	9.7 U	8.8 U
3-Methylthiophene	µg/m3	11 U	12 U	23 J	13 U	11 U
Carbon disulfide	µg/m3	26	11 J	430	31 J	12 J
Carbonyl sulfide	µg/m3	10 J	6.8 U	42	22	6.6 U
Diethyl disulfide	µg/m3	14 U	14 U	16 U	16 U	14 U
Diethyl sulfide	µg/m3	10 U	11 U	12 U	12 U	10 U
Ethyl mercaptan	µg/m3	7.2 U	7.4 U	8.0 U	7.9 U	7.2 U
Hydrogen sulfide	µg/m3	2.9 U	3.0 U	15	3.3 U	3.0 U
Methyl disulfide	µg/m3	5.4 U	5.6 U	8.9 J	6.0 U	5.5 U
Methyl ethyl sulfide	µg/m3	8.8 U	9.0 U	9.8 U	9.7 U	8.8 U
Methyl mercaptan	µg/m3	5.5 U	5.7 U	11 J	6.1 U	5.6 U
Methyl sulfide	µg/m3	7.2 U	7.4 U	8.0 U	7.9 U	7.2 U
Tetrahydro-Thiophene (Thiophane)	µg/m3	10 U	10 U	11 U	11 U	10 U
Thiophene	µg/m3	9.7 U	10 U	24 J	11 U	9.8 U

Table 2

**Analytical Results Summary  
Annual Air Monitoring  
FMC Avtex Fibers Superfund Site  
Front Royal, Virginia  
September 2019**

Location ID: Sample Name: Sample Date:		PERIM-NE P-NE 09/04/2019	PERIM-NW P-NW 09/04/2019	PERIM-S P-S 09/04/2019	PERIM-SE P-SE 09/04/2019	PERIM-SW P-SW 09/04/2019	PERIM-W P-W 09/04/2019
Parameters	Unit						
<b>General Chemistry</b>							
1-Butanethiol (n-Butyl mercaptan)	µg/m3	10 U	11 U	11 U	11 U	11 U	11 U
1-Isobutanethiol	µg/m3	10 U	11 U	11 U	11 U	11 U	11 U
1-Propanethiol (Propyl mercaptan)	µg/m3	8.8 U	9.2 U	8.9 U	9.0 U	9.2 U	8.9 U
2,5-Dimethylthiophene	µg/m3	13 U	13 U	13 U	13 U	13 U	13 U
2-Ethylthiophene	µg/m3	13 U	13 U	13 U	13 U	13 U	13 U
2-Methyl-2-propanethiol (tert-Butyl mercaptan)	µg/m3	10 U	11 U	11 U	11 U	11 U	11 U
2-Propanethiol (Isopropyl mercaptan)	µg/m3	8.8 U	9.2 U	8.9 U	9.0 U	9.2 U	8.9 U
3-Methylthiophene	µg/m3	11 U	12 U	11 U	12 U	12 U	11 U
Carbon disulfide	µg/m3	26	4.6 U	4.5 U	6.5 J	6.4 J	22
Carbonyl sulfide	µg/m3	11 J	6.9 U	6.7 U	6.7 U	6.9 U	6.7 U
Diethyl disulfide	µg/m3	14 U	15 U	14 U	14 U	15 U	14 U
Diethyl sulfide	µg/m3	10 U	11 U	11 U	11 U	11 U	11 U
Ethyl mercaptan	µg/m3	7.2 U	7.5 U	7.3 U	7.3 U	7.5 U	7.3 U
Hydrogen sulfide	µg/m3	2.9 U	3.1 U	3.0 U	3.0 U	3.1 U	7.6 J
Methyl disulfide	µg/m3	5.4 U	5.7 U	5.5 U	5.5 U	5.7 U	5.5 U
Methyl ethyl sulfide	µg/m3	8.8 U	9.2 U	8.9 U	9.0 U	9.2 U	8.9 U
Methyl mercaptan	µg/m3	5.5 U	5.8 U	5.6 U	5.7 U	5.8 U	5.6 U
Methyl sulfide	µg/m3	7.2 U	7.5 U	7.3 U	7.3 U	7.5 U	7.3 U
Tetrahydro-Thiophene (Thiophane)	µg/m3	10 U	11 U	10 U	10 U	11 U	10 U
Thiophene	µg/m3	9.7 U	10 U	9.8 U	9.9 U	10 U	9.8 U

## Notes:

- J - Estimated concentration  
U - Not detected at the associated reporting limit

**Table 3**

**Analytical Method  
Annual Air Monitoring  
FMC Avtex Fibers Superfund Site  
Front Royal, Virginia  
September 2019**

<b>Parameter</b>	<b>Method</b>	<b>Matrix</b>	<b>Collection to Analysis (Days)</b>
Sulfur Compounds in Air	ASTM D 5504-12 <sup>(1)</sup>	Air	7

**Notes:**

- (1) - "ASTM Standard Test Method for Determination of Sulfur Compounds in Natural Gas and Gaseous Fuels by Gas Chromatography and Chemiluminescence"
- ASTM - American Society for Testing and Materials



**Table 4**

**Qualified Sample Data Due to Variability in Field Duplicate Results**  
**Annual Air Monitoring**  
**FMC Avtex Fibers Superfund Site**  
**Front Royal, Virginia**  
**September 2019**

<b>Parameter</b>	<b>Analyte</b>	<b>RPD</b>	<b>Sample ID</b>	<b>Qualified Result</b>	<b>Field Duplicate Sample ID</b>	<b>Qualified Result</b>	<b>Units</b>
Sulfur Compounds	Carbon disulfide	88.4	P-N	31 J	DUP2-090319	12 J	µg/m3
Sulfur Compounds	Carbon disulfide	34	OU-7-NE	9.2 J	DUP1-090319	13 J	µg/m3

**Notes:**

RPD - Relative Percent Difference  
J - Estimated concentration



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Simi Valley, CA 93065  
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[www.alsglobal.com](http://www.alsglobal.com)

## LABORATORY REPORT

September 26, 2019

Deb Andrasko  
GHD Services Inc.  
2055 Niagara Falls Blvd., Suite 3  
Niagara Falls, NY 14304

**RE: FMC-Avtex Front Royal, VA / FMCC-11119510-001**

Dear Deb:

Enclosed are the results of the samples submitted to our laboratory on September 12, 2019. For your reference, these analyses have been assigned our service request number P1905427.

All analyses were performed according to our laboratory's NELAP and DoD-ELAP-approved quality assurance program. The test results meet requirements of the current NELAP and DoD-ELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP and DoD-ELAP-accredited analytes, refer to the certifications section at [www.alsglobal.com](http://www.alsglobal.com). Results are intended to be considered in their entirety and apply only to the samples analyzed and reported herein.

If you have any questions, please call me at (805) 526-7161.

Respectfully submitted,

**ALS | Environmental**



*By Sue Anderson at 11:45 am, Sep 26, 2019*

Sue Anderson  
Project Manager



2655 Park Center Dr., Suite A  
Simi Valley, CA 93065  
T: +1 805 526 7161  
[www.alsglobal.com](http://www.alsglobal.com)

Client: GHD Services Inc.  
Project: FMC-Avtex Front Royal, VA / FMCC-11119510-001

Service Request No: P1905427  
New York Lab ID: 11221

## CASE NARRATIVE

The samples were received intact under chain of custody on September 12, 2019 and were stored in accordance with the analytical method requirements. The Samples were received past the recommended holding time. The analysis was performed as soon as possible after receipt by the laboratory. The data is flagged to indicate the holding time exceedance. Please refer to the sample acceptance check form for additional information. The results reported herein are applicable only to the condition of the samples at the time of sample receipt.

### Sulfur Analysis

The samples were analyzed for twenty sulfur compounds per ASTM D 5504-12 using a gas chromatograph equipped with a sulfur chemiluminescence detector (SCD). All compounds with the exception of hydrogen sulfide and carbonyl sulfide are quantitated against the initial calibration curve for methyl mercaptan. This method is included on the laboratory's NELAP scope of accreditation, however it is not part of the DoD-ELAP accreditation.

*The results of analyses are given in the attached laboratory report. All results are intended to be considered in their entirety, and ALS Environmental (ALS) is not responsible for utilization of less than the complete report.*

*Use of ALS Environmental (ALS)'s Name. Client shall not use ALS's name or trademark in any marketing or reporting materials, press releases or in any other manner ("Materials") whatsoever and shall not attribute to ALS any test result, tolerance or specification derived from ALS's data ("Attribution") without ALS's prior written consent, which may be withheld by ALS for any reason in its sole discretion. To request ALS's consent, Client shall provide copies of the proposed Materials or Attribution and describe in writing Client's proposed use of such Materials or Attribution. If ALS has not provided written approval of the Materials or Attribution within ten (10) days of receipt from Client, Client's request to use ALS's name or trademark in any Materials or Attribution shall be deemed denied. ALS may, in its discretion, reasonably charge Client for its time in reviewing Materials or Attribution requests. Client acknowledges and agrees that the unauthorized use of ALS's name or trademark may cause ALS to incur irreparable harm for which the recovery of money damages will be inadequate. Accordingly, Client acknowledges and agrees that a violation shall justify preliminary injunctive relief. For questions contact the laboratory.*



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 Simi Valley, CA 93065  
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ALS Environmental – Simi Valley

CERTIFICATIONS, ACCREDITATIONS, AND REGISTRATIONS

Agency	Web Site	Number
Alaska DEC	<a href="http://dec.alaska.gov/eh/lab.aspx">http://dec.alaska.gov/eh/lab.aspx</a>	17-019
Arizona DHS	<a href="http://www.azdhs.gov/preparedness/state-laboratory/lab-licensure-certification/index.php#laboratory-licensure-home">http://www.azdhs.gov/preparedness/state-laboratory/lab-licensure-certification/index.php#laboratory-licensure-home</a>	AZ0694
Florida DOH (NELAP)	<a href="http://www.floridahealth.gov/licensing-and-regulation/environmental-laboratories/index.html">http://www.floridahealth.gov/licensing-and-regulation/environmental-laboratories/index.html</a>	E871020
Louisiana DEQ (NELAP)	<a href="http://www.deq.louisiana.gov/page/la-lab-accreditation">http://www.deq.louisiana.gov/page/la-lab-accreditation</a>	05071
Maine DHHS	<a href="http://www.maine.gov/dhhs/mecdc/environmental-health/dwp/professionals/labCert.shtml">http://www.maine.gov/dhhs/mecdc/environmental-health/dwp/professionals/labCert.shtml</a>	2018027
Minnesota DOH (NELAP)	<a href="http://www.health.state.mn.us/accreditation">http://www.health.state.mn.us/accreditation</a>	1521096
New Jersey DEP (NELAP)	<a href="http://www.nj.gov/dep/enforcement/oqa.html">http://www.nj.gov/dep/enforcement/oqa.html</a>	CA009
New York DOH (NELAP)	<a href="http://www.wadsworth.org/labcert/elap/elap.html">http://www.wadsworth.org/labcert/elap/elap.html</a>	11221
Oregon PHD (NELAP)	<a href="http://www.oregon.gov/oha/ph/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx">http://www.oregon.gov/oha/ph/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx</a>	4068-006
Pennsylvania DEP	<a href="http://www.dep.pa.gov/Business/OtherPrograms/Labs/Pages/Laboratory-Accreditation-Program.aspx">http://www.dep.pa.gov/Business/OtherPrograms/Labs/Pages/Laboratory-Accreditation-Program.aspx</a>	68-03307 (Registration)
PJLA (DoD ELAP)	<a href="http://www.pjlabs.com/search-accredited-labs">http://www.pjlabs.com/search-accredited-labs</a>	65818 (Testing)
Texas CEQ (NELAP)	<a href="http://www.tceq.texas.gov/agency/qa/env_lab_accreditation.html">http://www.tceq.texas.gov/agency/qa/env_lab_accreditation.html</a>	T104704413-19-10
Utah DOH (NELAP)	<a href="http://health.utah.gov/lab/lab_cert_env">http://health.utah.gov/lab/lab_cert_env</a>	CA016272019-10
Washington DOE	<a href="http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html">http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html</a>	C946
<p>Analyses were performed according to our laboratory's NELAP and DoD-ELAP approved quality assurance program. A complete listing of specific NELAP and DoD-ELAP certified analytes can be found in the certifications section at <a href="http://www.alsglobal.com">www.alsglobal.com</a>, or at the accreditation body's website.</p> <p>Each of the certifications listed above have an explicit Scope of Accreditation that applies to specific matrices/methods/analytes; therefore, please contact the laboratory for information corresponding to a particular certification.</p>		

# ALS ENVIRONMENTAL

## DETAIL SUMMARY REPORT

Client: GHD Services Inc.  
Project ID: FMC-Avtex Front Royal, VA / FMCC-11119510-001

Service Request: P1905427

Date Received: 9/12/2019  
Time Received: 09:10

ASTM D 5504-12 - Sulfur Can

Client Sample ID	Lab Code	Matrix	Date Collected	Time Collected	Container ID	Pi1 (psig)	Pf1 (psig)	
OU-7-NE	P1905427-001	Air	9/4/2019	14:33	SSC00193	-1.80	3.74	X
DUP1-090319	P1905427-002	Air	9/4/2019	14:35	SSC00424	-0.96	3.87	X
OU-7-N	P1905427-003	Air	9/4/2019	14:38	SSC00437	-1.51	3.54	X
OU-7-NW	P1905427-005	Air	9/4/2019	14:41	SSC00359	-2.56	3.78	X
OU-7-SW	P1905427-006	Air	9/4/2019	14:45	SSC00412	-1.55	3.80	X
P-DOWN-NNE	P1905427-008	Air	9/4/2019	14:55	SSC00492	-2.08	3.64	X
P-N	P1905427-010	Air	9/4/2019	14:59	SSC00515	-2.81	3.81	X
DUP2-090319	P1905427-011	Air	9/4/2019	15:04	SSC00347	-1.70	3.75	X
P-NW	P1905427-012	Air	9/4/2019	15:06	SSC00221	-2.27	3.60	X
P-W	P1905427-013	Air	9/4/2019	15:10	SSC00274	-1.87	3.60	X
P-SW	P1905427-015	Air	9/4/2019	15:15	SSC00498	-2.15	3.70	X
P-S	P1905427-016	Air	9/4/2019	15:18	SSC00481	-1.80	3.69	X
P-E	P1905427-017	Air	9/4/2019	15:25	SSC00174	-2.98	3.65	X
P-NE	P1905427-019	Air	9/4/2019	15:29	SSC00489	-1.58	3.80	X
P-SE	P1905427-020	Air	9/4/2019	15:33	SSC00283	-1.92	3.68	X
OU-7-SE	P1905427-021	Air	9/4/2019	15:36	SSC00188	-1.59	3.76	X
OU-7-S	P1905427-022	Air	9/4/2019	14:48	SSC00416	-2.01	4.13	X





# Air - Chain of Custody Record & Analytical Service Request

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Page 1 of 2

Company Name & Address (Reporting Information)				Requested Turnaround Time in Business Days (Surcharges) please circle				ALS Project No.	
Parsons 16 HD				1 Day (100%) 2 Day (75%) 3 Day (50%) 4 Day (35%) 5 Day (25%) 10 Day-Standard					
4705 Hedgemoore Dr Charlotte NC 28270									
Project Manager				Project Name				ALS Contact:	
Mike Robinson				FMC - Autex Front Royal, VA					
Phone				Project Number				Analysis Method	
704-558-4255				FMC-11119510-001				Reduced Solvent ASTM D 5504	
Fax				P.O. # / Billing Information					
Email Address for Result Reporting				Sampler (Print & Sign)					
Michael.Robinson@Parsons.com				Muc Harda / Muc Harda					
Client Sample ID	Laboratory ID Number	Date Collected	Time Collected	Canister ID (Bar code # - AC, SC, etc.)	Flow Controller ID (Bar code # - FC #)	Canister Start Pressure "Hg	Canister End Pressure "Hg/psig	Sample Volume	Comments e.g. Actual Preservative or specific instructions
OU-7-NE		9/4/19	1433	SSC 00193	SFC 00201	-29.62	-4	6L	
DUP1-090319		9/4/19	1435	SSC 00124	SFC 00312	-29.64	-2	6L	
OU-7-N	Muc	9/4/19	1438	SSC 00437	SFC 00269	-29.64	-2	6L	
OU-7-N (Backup)		9/4/19	1438	SSC 00413	SFC 00182	-29.65	-3	6L	
OU-7-NW		9/4/19	1441	SSC 00359	SFC 00039	-27.26	-5	6L	
OU-7-SW		9/4/19	1445	SSC 00412	SFC 00221	-29.64	-3	6L	
OU-7-SW (Backup)		9/4/19	1445	SSC 00135	SFC 00064	-29.64	-4	6L	
P-Down-NNE		9/4/19	1455	SSC 00492	SFC 00178	-29.60	-5	6L	
P-Down-NNE (Backup)		9/4/19	1455	SSC 00335	SFC 00414	-29.65	-5	6L	
P-N		9/4/19	1459	SSC 00515	SFC 00208	-29.63	-4	6L	
DUP2-090319		9/4/19	1504	SSC 00347	SFC 00350	-29.62	-3	6L	
P-NW		9/4/19	1506	SSC 00221	SFC 00039	-29.64	-4	6L	
P-W		9/4/19	1510	SSC 00277	SFC 00201	-29.68	-4	6L	
P-W (Backup)		9/4/19	1510	SSC 00363	SFC 00265	-29.63	-3	6L	
Report Tier Levels - please select									
Tier I - Results (Default if not specified)				Tier III (Results + QC & Calibration Summaries)					
Tier II (Results + QC Summaries)				Tier IV (Data Validation Package) 10% Surcharge					
Relinquished by: (Signature)				Relinquished by: (Signature)					
Date: 9/5/19				Date: 9/5/19					
Time: 1200				Time: 1200					
Relinquished by: (Signature)				Relinquished by: (Signature)					
Date:				Date:					
Time:				Time:					
Cooler / Blank Temperature °C				Cooler / Blank Temperature °C					





# Air - Chain of Custody Record & Analytical Service Request

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Phone (805) 526-7161

Page 1 of 2

Company Name & Address (Reporting Information) Parsons / GHD 4701 Hedgemoor Dr Charlotte NC 28270				Project Name FMC - Autex Front Royal, VA				Requested Turnaround Time in Business Days (Surcharges) please circle 1 Day (100%) 2 Day (75%) 3 Day (50%) 4 Day (35%) 5 Day (25%) 10 Day-Standard				ALS Project No. P1905477	
Project Manager Mike Robinson				Project Number FMCC-11119510-001				ALS Contact:					
Phone 704-558-4255				P.O. # / Billing Information				Analysis Method Reduced sulfur compounds ASTM D 5504				Comments e.g. Actual Preservative or specific instructions	
Email Address for Result Reporting Michael.Robinson@Parsons.com				Sampler (Print & Sign) Marc Harder									
Client Sample ID		Laboratory ID Number	Date Collected	Time Collected	Canister ID (Bar code # - AC, SC, etc.)	Flow Controller ID (Bar code # - FC #)	Canister Start Pressure "Hg	Canister End Pressure "Hg/psig	Sample Volume				
OU-7-NW	1	9/4/19	1433	1433	SSC00193	SFC00301	-29.62	-4	6L	X			
DUP1-090319	1	9/4/19	1435	1435	SSC00124	SFC00312	-29.64	-2	6L	X			
OU-7-N	3	9/4/19	1438	1438	SSC00436	SFC00219	-29.64	-2	6L	X			
OU-7-N (Backup)	4	9/4/19	1438	1438	SSC00413	SFC00182	-29.65	-3	6L	HOLD			
OU-7-NW	5	9/4/19	1441	1441	SSC00359	SFC00039	-27.26	-5	6L	X			
OU-7-SW	6	9/4/19	1445	1445	SSC00412	SFC00221	-29.64	-3	6L	X			
OU-7-SW (Backup)	7	9/4/19	1445	1445	SSC00135	SFC00064	-29.64	-4	6L	HOLD			
P-Down-NNE	8	9/4/19	1455	1455	SSC00492	SFC00178	-29.60	-5	6L	X			
P-Down-NNE (Backup)	9	9/4/19	1455	1455	SSC00335	SFC00414	-29.65	-5	6L	HOLD			
P-N	10	9/4/19	1459	1459	SSC00515	SFC00208	-29.63	-4	6L	X			
DUP2-090319	11	9/4/19	1504	1504	SSC00347	SFC00035	-29.62	-3	6L	X			
P-NW	12	9/4/19	1506	1506	SSC00221	SFC00039	-29.64	-4	6L	X			
P-W	13	9/4/19	1510	1510	SSC00274	SFC00201	-29.68	-4	6L	X			
P-W (Backup)	14	9/4/19	1510	1510	SSC00363	SFC00225	-29.63	-3	6L	HOLD			
Report Tier Levels - please select Tier I - Results (Default if not specified) Tier II (Results + QC Summaries) Tier III (Results + QC & Calibration Summaries) Tier IV (Data Validation Package) 10% Surcharge				Chain of Custody Seal: (Circle) INTACT BROKEN ABSENT				Project Requirements (MRLs, QAPP)					
Relinquished by: (Signature) [Signature]				Received by: (Signature) [Signature]				Date: 9/5/19 Time: 9:10					
Relinquished by: (Signature) [Signature]				Received by: (Signature) [Signature]				Date: [ ] Time: [ ]					



Page 2 of 2

## Air - Chain of Custody Record & Analytical Service Request

2655 Park Center Drive, Suite A  
Simi Valley, California 93065  
Phone (805) 526-7161

[illegible]



**ALS Environmental**  
**Sample Acceptance Check Form**

Client: GHD Services Inc.

Work order: P1905427

Project: FMC-Avtex Front Royal, VA / FMCC-11119510-001

Sample(s) received on: 9/12/19

Date opened: 9/12/19

by: DENISE.POSADA

**Note:** This form is used for all samples received by ALS. The use of this form for custody seals is strictly meant to indicate presence/absence and not as an indication of compliance or nonconformity. Thermal preservation and pH will only be evaluated either at the request of the client and/or as required by the method/SOP.

	<b>Yes</b>	<b>No</b>	<b>N/A</b>
1 Were <b>sample containers</b> properly marked with client sample ID?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2 Did <b>sample containers</b> arrive in good condition?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3 Were <b>chain-of-custody</b> papers used and filled out?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4 Did <b>sample container labels</b> and/or tags agree with custody papers?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5 Was <b>sample volume</b> received adequate for analysis?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6 Are samples within specified holding times?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
7 Was proper <b>temperature</b> (thermal preservation) of cooler at receipt adhered to?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
8 Were <b>custody seals</b> on outside of cooler/Box/Container?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Location of seal(s)? _____ Sealing Lid?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Were signature and date included?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Were seals intact?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
9 Do containers have appropriate <b>preservation</b> , according to method/SOP or Client specified information?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Is there a client indication that the submitted samples are <b>pH</b> preserved?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Were <b>VOA vials</b> checked for presence/absence of air bubbles?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Does the client/method/SOP require that the analyst check the sample pH and <u>if necessary</u> alter it?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
10 <b>Tubes:</b> Are the tubes capped and intact?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
11 <b>Badges:</b> Are the badges properly capped and intact?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Are dual bed badges separated and individually capped and intact?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Lab Sample ID	Container Description	Required pH *	Received pH	Adjusted pH	VOA Headspace (Presence/Absence)	Receipt / Preservation Comments
P1905427-001.01	6.0 L Silonite Can					
P1905427-002.01	6.0 L Silonite Can					
P1905427-003.01	6.0 L Silonite Can					
P1905427-004.01	6.0 L Silonite Can					
P1905427-005.01	6.0 L Silonite Can					
P1905427-006.01	6.0 L Silonite Can					
P1905427-007.01	6.0 L Silonite Can					
P1905427-008.01	6.0 L Silonite Can					
P1905427-009.01	6.0 L Silonite Can					
P1905427-010.01	6.0 L Silonite Can					
P1905427-011.01	6.0 L Silonite Can					
P1905427-012.01	6.0 L Silonite Can					
P1905427-013.01	6.0 L Silonite Can					
P1905427-014.01	6.0 L Silonite Can					
P1905427-015.01	6.0 L Silonite Can					

Explain any discrepancies: (include lab sample ID numbers): \_\_\_\_\_

Samples were sampled on 9/4/19 and received on 9/12/19 for sulfur analysis

Sample -003: COC denotes ID as SSC00436 but the correct ID is SSC00437. Client sent revised page 1 of the COC correcting the error.

RSK - MEEPP, HCL (pH<2); RSK - CO2, (pH 5-8); Sulfur (pH>4)

## ALS Environmental Sample Acceptance Check Form

Client: GHD Services Inc.

Work order: P1905427

Project: FMC-Avtex Front Royal, VA / FMCC-11119510-001

Sample(s) received on: 9/12/19

Date opened: 9/12/19

by: DENISE.POSADA

[illegible]

Explain any discrepancies: (include lab sample ID numbers):

RESULTS OF ANALYSIS

Page 1 of 1

**Client:** GHD Services Inc.  
**Client Sample ID:** OU-7-NE  
**Client Project ID:** FMC-Avtex Front Royal, VA / FMCC-11119510-001

ALS Project ID: P1905427  
 ALS Sample ID: P1905427-001

Test Code: ASTM D 5504-12  
 Instrument ID: Agilent 7890A/GC22/SCD  
 Analyst: Wade Henton/Gilbert Gutierrez  
 Sample Type: 6.0 L Silonite Canister  
 Test Notes: **H3**  
 Container ID: SSC00193

Date Collected: 9/4/19  
 Time Collected: 14:33  
 Date Received: 9/12/19  
 Date Analyzed: 9/13/19  
 Time Analyzed: 08:31  
 Volume(s) Analyzed: 1.0 ml(s)

Initial Pressure (psig): -1.80 Final Pressure (psig): 3.74

Container Dilution Factor: 1.43

CAS #	Compound	Result µg/m <sup>3</sup>	MRL µg/m <sup>3</sup>	MDL µg/m <sup>3</sup>	Result ppbV	MRL ppbV	MDL ppbV	Data Qualifier
7783-06-4	Hydrogen Sulfide	ND	10	3.0	ND	7.2	2.1	
463-58-1	Carbonyl Sulfide	ND	18	6.7	ND	7.2	2.7	
74-93-1	Methyl Mercaptan	ND	14	5.6	ND	7.2	2.9	
75-08-1	Ethyl Mercaptan	ND	18	7.3	ND	7.2	2.9	
75-18-3	Dimethyl Sulfide	ND	18	7.3	ND	7.2	2.9	
75-15-0	Carbon Disulfide	<b>9.2</b>	11	4.5	<b>3.0</b>	3.6	1.4	<b>J</b>
75-33-2	Isopropyl Mercaptan	ND	22	8.9	ND	7.2	2.9	
75-66-1	tert-Butyl Mercaptan	ND	26	11	ND	7.2	2.9	
107-03-9	n-Propyl Mercaptan	ND	22	8.9	ND	7.2	2.9	
624-89-5	Ethyl Methyl Sulfide	ND	22	8.9	ND	7.2	2.9	
110-02-1	Thiophene	ND	25	9.8	ND	7.2	2.9	
513-44-0	Isobutyl Mercaptan	ND	26	11	ND	7.2	2.9	
352-93-2	Diethyl Sulfide	ND	26	11	ND	7.2	2.9	
109-79-5	n-Butyl Mercaptan	ND	26	11	ND	7.2	2.9	
624-92-0	Dimethyl Disulfide	ND	14	5.5	ND	3.6	1.4	
616-44-4	3-Methylthiophene	ND	29	11	ND	7.2	2.9	
110-01-0	Tetrahydrothiophene	ND	26	10	ND	7.2	2.9	
638-02-8	2,5-Dimethylthiophene	ND	33	13	ND	7.2	2.9	
872-55-9	2-Ethylthiophene	ND	33	13	ND	7.2	2.9	
110-81-6	Diethyl Disulfide	ND	18	14	ND	3.6	2.9	

ND = Compound was analyzed for, but not detected above the laboratory detection limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

H3 = Sample was received and analyzed past holding time.

J = The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.

RESULTS OF ANALYSIS

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**Client:** GHD Services Inc.  
**Client Sample ID:** DUP1-090319  
**Client Project ID:** FMC-Avtex Front Royal, VA / FMCC-11119510-001

ALS Project ID: P1905427  
 ALS Sample ID: P1905427-002

Test Code: ASTM D 5504-12  
 Instrument ID: Agilent 7890A/GC22/SCD  
 Analyst: Wade Henton/Gilbert Gutierrez  
 Sample Type: 6.0 L Silonite Canister  
 Test Notes: **H3**  
 Container ID: SSC00424

Date Collected: 9/4/19  
 Time Collected: 14:35  
 Date Received: 9/12/19  
 Date Analyzed: 9/13/19  
 Time Analyzed: 08:49  
 Volume(s) Analyzed: 1.0 ml(s)

Initial Pressure (psig): -0.96 Final Pressure (psig): 3.87

Container Dilution Factor: 1.35

CAS #	Compound	Result µg/m <sup>3</sup>	MRL µg/m <sup>3</sup>	MDL µg/m <sup>3</sup>	Result ppbV	MRL ppbV	MDL ppbV	Data Qualifier
7783-06-4	Hydrogen Sulfide	ND	9.4	2.8	ND	6.8	2.0	
463-58-1	Carbonyl Sulfide	<b>8.7</b>	17	6.3	<b>3.6</b>	6.8	2.6	<b>J</b>
74-93-1	Methyl Mercaptan	ND	13	5.3	ND	6.8	2.7	
75-08-1	Ethyl Mercaptan	ND	17	6.9	ND	6.8	2.7	
75-18-3	Dimethyl Sulfide	<b>9.3</b>	17	6.9	<b>3.7</b>	6.8	2.7	<b>J</b>
75-15-0	Carbon Disulfide	<b>13</b>	11	4.2	<b>4.0</b>	3.4	1.4	
75-33-2	Isopropyl Mercaptan	ND	21	8.4	ND	6.8	2.7	
75-66-1	tert-Butyl Mercaptan	ND	25	10	ND	6.8	2.7	
107-03-9	n-Propyl Mercaptan	ND	21	8.4	ND	6.8	2.7	
624-89-5	Ethyl Methyl Sulfide	ND	21	8.4	ND	6.8	2.7	
110-02-1	Thiophene	ND	23	9.3	ND	6.8	2.7	
513-44-0	Isobutyl Mercaptan	ND	25	10	ND	6.8	2.7	
352-93-2	Diethyl Sulfide	ND	25	10	ND	6.8	2.7	
109-79-5	n-Butyl Mercaptan	ND	25	10	ND	6.8	2.7	
624-92-0	Dimethyl Disulfide	<b>140</b>	13	5.2	<b>35</b>	3.4	1.4	
616-44-4	3-Methylthiophene	ND	27	11	ND	6.8	2.7	
110-01-0	Tetrahydrothiophene	ND	24	9.7	ND	6.8	2.7	
638-02-8	2,5-Dimethylthiophene	ND	31	12	ND	6.8	2.7	
872-55-9	2-Ethylthiophene	ND	31	12	ND	6.8	2.7	
110-81-6	Diethyl Disulfide	ND	17	13	ND	3.4	2.7	

ND = Compound was analyzed for, but not detected above the laboratory detection limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

H3 = Sample was received and analyzed past holding time.

J = The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.

## RESULTS OF ANALYSIS

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**Client:** GHD Services Inc.  
**Client Sample ID:** OU-7-N  
**Client Project ID:** FMC-Avtex Front Royal, VA / FMCC-11119510-001

ALS Project ID: P1905427  
 ALS Sample ID: P1905427-003

Test Code: ASTM D 5504-12  
 Instrument ID: Agilent 7890A/GC22/SCD  
 Analyst: Wade Henton/Gilbert Gutierrez  
 Sample Type: 6.0 L Silonite Canister  
 Test Notes: **H3**  
 Container ID: SSC00437

Date Collected: 9/4/19  
 Time Collected: 14:38  
 Date Received: 9/12/19  
 Date Analyzed: 9/13/19  
 Time Analyzed: 09:09  
 Volume(s) Analyzed: 1.0 ml(s)

Initial Pressure (psig): -1.51      Final Pressure (psig): 3.54

Container Dilution Factor: 1.38

CAS #	Compound	Result µg/m <sup>3</sup>	MRL µg/m <sup>3</sup>	MDL µg/m <sup>3</sup>	Result ppbV	MRL ppbV	MDL ppbV	Data Qualifier
7783-06-4	Hydrogen Sulfide	ND	9.6	2.9	ND	6.9	2.1	
463-58-1	Carbonyl Sulfide	ND	17	6.4	ND	6.9	2.6	
74-93-1	Methyl Mercaptan	ND	14	5.4	ND	6.9	2.8	
75-08-1	Ethyl Mercaptan	ND	18	7.0	ND	6.9	2.8	
75-18-3	Dimethyl Sulfide	ND	18	7.0	ND	6.9	2.8	
75-15-0	Carbon Disulfide	<b>7.7</b>	11	4.3	<b>2.5</b>	3.5	1.4	<b>J</b>
75-33-2	Isopropyl Mercaptan	ND	21	8.6	ND	6.9	2.8	
75-66-1	tert-Butyl Mercaptan	ND	25	10	ND	6.9	2.8	
107-03-9	n-Propyl Mercaptan	ND	21	8.6	ND	6.9	2.8	
624-89-5	Ethyl Methyl Sulfide	ND	21	8.6	ND	6.9	2.8	
110-02-1	Thiophene	ND	24	9.5	ND	6.9	2.8	
513-44-0	Isobutyl Mercaptan	ND	25	10	ND	6.9	2.8	
352-93-2	Diethyl Sulfide	ND	25	10	ND	6.9	2.8	
109-79-5	n-Butyl Mercaptan	ND	25	10	ND	6.9	2.8	
624-92-0	Dimethyl Disulfide	ND	13	5.3	ND	3.5	1.4	
616-44-4	3-Methylthiophene	ND	28	11	ND	6.9	2.8	
110-01-0	Tetrahydrothiophene	ND	25	9.9	ND	6.9	2.8	
638-02-8	2,5-Dimethylthiophene	ND	32	13	ND	6.9	2.8	
872-55-9	2-Ethylthiophene	ND	32	13	ND	6.9	2.8	
110-81-6	Diethyl Disulfide	ND	17	14	ND	3.5	2.8	

ND = Compound was analyzed for, but not detected above the laboratory detection limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

H3 = Sample was received and analyzed past holding time.

J = The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.

## RESULTS OF ANALYSIS

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**Client:** GHD Services Inc.  
**Client Sample ID:** OU-7-NW  
**Client Project ID:** FMC-Avtex Front Royal, VA / FMCC-11119510-001

ALS Project ID: P1905427  
 ALS Sample ID: P1905427-005

Test Code: ASTM D 5504-12  
 Instrument ID: Agilent 7890A/GC22/SCD  
 Analyst: Wade Henton/Gilbert Gutierrez  
 Sample Type: 6.0 L Silonite Canister  
 Test Notes: **H3**  
 Container ID: SSC00359

Date Collected: 9/4/19  
 Time Collected: 14:41  
 Date Received: 9/12/19  
 Date Analyzed: 9/13/19  
 Time Analyzed: 09:26  
 Volume(s) Analyzed: 1.0 ml(s)

Initial Pressure (psig): -2.56      Final Pressure (psig): 3.78

Container Dilution Factor: 1.52

CAS #	Compound	Result µg/m <sup>3</sup>	MRL µg/m <sup>3</sup>	MDL µg/m <sup>3</sup>	Result ppbV	MRL ppbV	MDL ppbV	Data Qualifier
7783-06-4	Hydrogen Sulfide	ND	11	3.2	ND	7.6	2.3	
463-58-1	Carbonyl Sulfide	ND	19	7.1	ND	7.6	2.9	
74-93-1	Methyl Mercaptan	ND	15	6.0	ND	7.6	3.0	
75-08-1	Ethyl Mercaptan	ND	19	7.7	ND	7.6	3.0	
75-18-3	Dimethyl Sulfide	ND	19	7.7	ND	7.6	3.0	
75-15-0	Carbon Disulfide	ND	12	4.7	ND	3.8	1.5	
75-33-2	Isopropyl Mercaptan	ND	24	9.5	ND	7.6	3.0	
75-66-1	tert-Butyl Mercaptan	ND	28	11	ND	7.6	3.0	
107-03-9	n-Propyl Mercaptan	ND	24	9.5	ND	7.6	3.0	
624-89-5	Ethyl Methyl Sulfide	ND	24	9.5	ND	7.6	3.0	
110-02-1	Thiophene	ND	26	10	ND	7.6	3.0	
513-44-0	Isobutyl Mercaptan	ND	28	11	ND	7.6	3.0	
352-93-2	Diethyl Sulfide	ND	28	11	ND	7.6	3.0	
109-79-5	n-Butyl Mercaptan	ND	28	11	ND	7.6	3.0	
624-92-0	Dimethyl Disulfide	ND	15	5.9	ND	3.8	1.5	
616-44-4	3-Methylthiophene	ND	31	12	ND	7.6	3.0	
110-01-0	Tetrahydrothiophene	ND	27	11	ND	7.6	3.0	
638-02-8	2,5-Dimethylthiophene	ND	35	14	ND	7.6	3.0	
872-55-9	2-Ethylthiophene	ND	35	14	ND	7.6	3.0	
110-81-6	Diethyl Disulfide	ND	19	15	ND	3.8	3.0	

ND = Compound was analyzed for, but not detected above the laboratory detection limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

H3 = Sample was received and analyzed past holding time.

## RESULTS OF ANALYSIS

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**Client:** GHD Services Inc.  
**Client Sample ID:** OU-7-SW  
**Client Project ID:** FMC-Avtex Front Royal, VA / FMCC-11119510-001

ALS Project ID: P1905427  
 ALS Sample ID: P1905427-006

Test Code: ASTM D 5504-12  
 Instrument ID: Agilent 7890A/GC22/SCD  
 Analyst: Wade Henton/Gilbert Gutierrez  
 Sample Type: 6.0 L Silonite Canister  
 Test Notes: **H3**  
 Container ID: SSC00412

Date Collected: 9/4/19  
 Time Collected: 14:45  
 Date Received: 9/12/19  
 Date Analyzed: 9/13/19  
 Time Analyzed: 10:11  
 Volume(s) Analyzed: 1.0 ml(s)

Initial Pressure (psig): -1.55      Final Pressure (psig): 3.80

Container Dilution Factor: 1.41

CAS #	Compound	Result µg/m <sup>3</sup>	MRL µg/m <sup>3</sup>	MDL µg/m <sup>3</sup>	Result ppbV	MRL ppbV	MDL ppbV	Data Qualifier
7783-06-4	Hydrogen Sulfide	ND	9.8	2.9	ND	7.1	2.1	
463-58-1	Carbonyl Sulfide	<b>10</b>	17	6.6	<b>4.2</b>	7.1	2.7	<b>J</b>
74-93-1	Methyl Mercaptan	ND	14	5.5	ND	7.1	2.8	
75-08-1	Ethyl Mercaptan	ND	18	7.2	ND	7.1	2.8	
75-18-3	Dimethyl Sulfide	ND	18	7.2	ND	7.1	2.8	
75-15-0	Carbon Disulfide	<b>26</b>	11	4.4	<b>8.5</b>	3.5	1.4	
75-33-2	Isopropyl Mercaptan	ND	22	8.8	ND	7.1	2.8	
75-66-1	tert-Butyl Mercaptan	ND	26	10	ND	7.1	2.8	
107-03-9	n-Propyl Mercaptan	ND	22	8.8	ND	7.1	2.8	
624-89-5	Ethyl Methyl Sulfide	ND	22	8.8	ND	7.1	2.8	
110-02-1	Thiophene	ND	24	9.7	ND	7.1	2.8	
513-44-0	Isobutyl Mercaptan	ND	26	10	ND	7.1	2.8	
352-93-2	Diethyl Sulfide	ND	26	10	ND	7.1	2.8	
109-79-5	n-Butyl Mercaptan	ND	26	10	ND	7.1	2.8	
624-92-0	Dimethyl Disulfide	ND	14	5.4	ND	3.5	1.4	
616-44-4	3-Methylthiophene	ND	28	11	ND	7.1	2.8	
110-01-0	Tetrahydrothiophene	ND	25	10	ND	7.1	2.8	
638-02-8	2,5-Dimethylthiophene	ND	32	13	ND	7.1	2.8	
872-55-9	2-Ethylthiophene	ND	32	13	ND	7.1	2.8	
110-81-6	Diethyl Disulfide	ND	18	14	ND	3.5	2.8	

ND = Compound was analyzed for, but not detected above the laboratory detection limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

H3 = Sample was received and analyzed past holding time.

J = The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.

RESULTS OF ANALYSIS

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**Client:** GHD Services Inc.  
**Client Sample ID:** P-DOWN-NNE  
**Client Project ID:** FMC-Avtex Front Royal, VA / FMCC-11119510-001

ALS Project ID: P1905427  
 ALS Sample ID: P1905427-008

Test Code: ASTM D 5504-12  
 Instrument ID: Agilent 7890A/GC22/SCD  
 Analyst: Wade Henton/Gilbert Gutierrez  
 Sample Type: 6.0 L Silonite Canister  
 Test Notes: **H3**  
 Container ID: SSC00492

Date Collected: 9/4/19  
 Time Collected: 14:55  
 Date Received: 9/12/19  
 Date Analyzed: 9/13/19  
 Time Analyzed: 10:32  
 Volume(s) Analyzed: 1.0 ml(s)

Initial Pressure (psig): -2.08      Final Pressure (psig): 3.64

Container Dilution Factor: 1.45

CAS #	Compound	Result µg/m³	MRL µg/m³	MDL µg/m³	Result ppbV	MRL ppbV	MDL ppbV	Data Qualifier
7783-06-4	Hydrogen Sulfide	ND	10	3.0	ND	7.3	2.2	
463-58-1	Carbonyl Sulfide	ND	18	6.8	ND	7.3	2.8	
74-93-1	Methyl Mercaptan	ND	14	5.7	ND	7.3	2.9	
75-08-1	Ethyl Mercaptan	ND	18	7.4	ND	7.3	2.9	
75-18-3	Dimethyl Sulfide	ND	18	7.4	ND	7.3	2.9	
75-15-0	Carbon Disulfide	<b>11</b>	11	4.5	<b>3.6</b>	3.6	1.5	<b>J</b>
75-33-2	Isopropyl Mercaptan	ND	23	9.0	ND	7.3	2.9	
75-66-1	tert-Butyl Mercaptan	ND	27	11	ND	7.3	2.9	
107-03-9	n-Propyl Mercaptan	ND	23	9.0	ND	7.3	2.9	
624-89-5	Ethyl Methyl Sulfide	ND	23	9.0	ND	7.3	2.9	
110-02-1	Thiophene	ND	25	10	ND	7.3	2.9	
513-44-0	Isobutyl Mercaptan	ND	27	11	ND	7.3	2.9	
352-93-2	Diethyl Sulfide	ND	27	11	ND	7.3	2.9	
109-79-5	n-Butyl Mercaptan	ND	27	11	ND	7.3	2.9	
624-92-0	Dimethyl Disulfide	ND	14	5.6	ND	3.6	1.5	
616-44-4	3-Methylthiophene	ND	29	12	ND	7.3	2.9	
110-01-0	Tetrahydrothiophene	ND	26	10	ND	7.3	2.9	
638-02-8	2,5-Dimethylthiophene	ND	33	13	ND	7.3	2.9	
872-55-9	2-Ethylthiophene	ND	33	13	ND	7.3	2.9	
110-81-6	Diethyl Disulfide	ND	18	14	ND	3.6	2.9	

ND = Compound was analyzed for, but not detected above the laboratory detection limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

H3 = Sample was received and analyzed past holding time.

J = The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.



RESULTS OF ANALYSIS

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**Client:** GHD Services Inc.  
**Client Sample ID:** P-N  
**Client Project ID:** FMC-Avtex Front Royal, VA / FMCC-11119510-001

ALS Project ID: P1905427  
 ALS Sample ID: P1905427-010

Test Code: ASTM D 5504-12  
 Instrument ID: Agilent 7890A/GC22/SCD  
 Analyst: Wade Henton/Gilbert Gutierrez  
 Sample Type: 6.0 L Silonite Canister  
 Test Notes: **H3**  
 Container ID: SSC00515

Date Collected: 9/4/19  
 Time Collected: 14:59  
 Date Received: 9/12/19  
 Date Analyzed: 9/13/19  
 Time Analyzed: 10:51  
 Volume(s) Analyzed: 1.0 ml(s)

Initial Pressure (psig): -2.81 Final Pressure (psig): 3.81

Container Dilution Factor: 1.56

CAS #	Compound	Result µg/m <sup>3</sup>	MRL µg/m <sup>3</sup>	MDL µg/m <sup>3</sup>	Result ppbV	MRL ppbV	MDL ppbV	Data Qualifier
7783-06-4	Hydrogen Sulfide	ND	11	3.3	ND	7.8	2.3	
463-58-1	Carbonyl Sulfide	<b>22</b>	19	7.3	<b>8.8</b>	7.8	3.0	
74-93-1	Methyl Mercaptan	ND	15	6.1	ND	7.8	3.1	
75-08-1	Ethyl Mercaptan	ND	20	7.9	ND	7.8	3.1	
75-18-3	Dimethyl Sulfide	ND	20	7.9	ND	7.8	3.1	
75-15-0	Carbon Disulfide	<b>31</b>	12	4.9	<b>9.9</b>	3.9	1.6	
75-33-2	Isopropyl Mercaptan	ND	24	9.7	ND	7.8	3.1	
75-66-1	tert-Butyl Mercaptan	ND	29	12	ND	7.8	3.1	
107-03-9	n-Propyl Mercaptan	ND	24	9.7	ND	7.8	3.1	
624-89-5	Ethyl Methyl Sulfide	ND	24	9.7	ND	7.8	3.1	
110-02-1	Thiophene	ND	27	11	ND	7.8	3.1	
513-44-0	Isobutyl Mercaptan	ND	29	12	ND	7.8	3.1	
352-93-2	Diethyl Sulfide	ND	29	12	ND	7.8	3.1	
109-79-5	n-Butyl Mercaptan	ND	29	12	ND	7.8	3.1	
624-92-0	Dimethyl Disulfide	ND	15	6.0	ND	3.9	1.6	
616-44-4	3-Methylthiophene	ND	31	13	ND	7.8	3.1	
110-01-0	Tetrahydrothiophene	ND	28	11	ND	7.8	3.1	
638-02-8	2,5-Dimethylthiophene	ND	36	14	ND	7.8	3.1	
872-55-9	2-Ethylthiophene	ND	36	14	ND	7.8	3.1	
110-81-6	Diethyl Disulfide	ND	19	16	ND	3.9	3.1	

ND = Compound was analyzed for, but not detected above the laboratory detection limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

H3 = Sample was received and analyzed past holding time.

RESULTS OF ANALYSIS

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**Client:** GHD Services Inc.  
**Client Sample ID:** DUP2-090319  
**Client Project ID:** FMC-Avtex Front Royal, VA / FMCC-11119510-001

ALS Project ID: P1905427  
 ALS Sample ID: P1905427-011

Test Code: ASTM D 5504-12  
 Instrument ID: Agilent 7890A/GC22/SCD  
 Analyst: Wade Henton/Gilbert Gutierrez  
 Sample Type: 6.0 L Silonite Canister  
 Test Notes: **H3**  
 Container ID: SSC00347

Date Collected: 9/4/19  
 Time Collected: 15:04  
 Date Received: 9/12/19  
 Date Analyzed: 9/13/19  
 Time Analyzed: 11:19  
 Volume(s) Analyzed: 1.0 ml(s)

Initial Pressure (psig): -1.70      Final Pressure (psig): 3.75

Container Dilution Factor: 1.42

CAS #	Compound	Result µg/m <sup>3</sup>	MRL µg/m <sup>3</sup>	MDL µg/m <sup>3</sup>	Result ppbV	MRL ppbV	MDL ppbV	Data Qualifier
7783-06-4	Hydrogen Sulfide	ND	9.9	3.0	ND	7.1	2.1	
463-58-1	Carbonyl Sulfide	ND	17	6.6	ND	7.1	2.7	
74-93-1	Methyl Mercaptan	ND	14	5.6	ND	7.1	2.8	
75-08-1	Ethyl Mercaptan	ND	18	7.2	ND	7.1	2.8	
75-18-3	Dimethyl Sulfide	ND	18	7.2	ND	7.1	2.8	
75-15-0	Carbon Disulfide	<b>12</b>	11	4.4	<b>3.8</b>	3.6	1.4	
75-33-2	Isopropyl Mercaptan	ND	22	8.8	ND	7.1	2.8	
75-66-1	tert-Butyl Mercaptan	ND	26	10	ND	7.1	2.8	
107-03-9	n-Propyl Mercaptan	ND	22	8.8	ND	7.1	2.8	
624-89-5	Ethyl Methyl Sulfide	ND	22	8.8	ND	7.1	2.8	
110-02-1	Thiophene	ND	24	9.8	ND	7.1	2.8	
513-44-0	Isobutyl Mercaptan	ND	26	10	ND	7.1	2.8	
352-93-2	Diethyl Sulfide	ND	26	10	ND	7.1	2.8	
109-79-5	n-Butyl Mercaptan	ND	26	10	ND	7.1	2.8	
624-92-0	Dimethyl Disulfide	ND	14	5.5	ND	3.6	1.4	
616-44-4	3-Methylthiophene	ND	28	11	ND	7.1	2.8	
110-01-0	Tetrahydrothiophene	ND	26	10	ND	7.1	2.8	
638-02-8	2,5-Dimethylthiophene	ND	33	13	ND	7.1	2.8	
872-55-9	2-Ethylthiophene	ND	33	13	ND	7.1	2.8	
110-81-6	Diethyl Disulfide	ND	18	14	ND	3.6	2.8	

ND = Compound was analyzed for, but not detected above the laboratory detection limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

H3 = Sample was received and analyzed past holding time.

RESULTS OF ANALYSIS

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**Client:** GHD Services Inc.  
**Client Sample ID:** P-NW  
**Client Project ID:** FMC-Avtex Front Royal, VA / FMCC-11119510-001

ALS Project ID: P1905427  
 ALS Sample ID: P1905427-012

Test Code: ASTM D 5504-12  
 Instrument ID: Agilent 7890A/GC22/SCD  
 Analyst: Wade Henton/Gilbert Gutierrez  
 Sample Type: 6.0 L Silonite Canister  
 Test Notes: **H3**  
 Container ID: SSC00221

Date Collected: 9/4/19  
 Time Collected: 15:06  
 Date Received: 9/12/19  
 Date Analyzed: 9/13/19  
 Time Analyzed: 11:36  
 Volume(s) Analyzed: 1.0 ml(s)

Initial Pressure (psig): -2.27 Final Pressure (psig): 3.60

Container Dilution Factor: 1.47

CAS #	Compound	Result µg/m³	MRL µg/m³	MDL µg/m³	Result ppbV	MRL ppbV	MDL ppbV	Data Qualifier
7783-06-4	Hydrogen Sulfide	ND	10	3.1	ND	7.4	2.2	
463-58-1	Carbonyl Sulfide	ND	18	6.9	ND	7.4	2.8	
74-93-1	Methyl Mercaptan	ND	14	5.8	ND	7.4	2.9	
75-08-1	Ethyl Mercaptan	ND	19	7.5	ND	7.4	2.9	
75-18-3	Dimethyl Sulfide	ND	19	7.5	ND	7.4	2.9	
75-15-0	Carbon Disulfide	ND	11	4.6	ND	3.7	1.5	
75-33-2	Isopropyl Mercaptan	ND	23	9.2	ND	7.4	2.9	
75-66-1	tert-Butyl Mercaptan	ND	27	11	ND	7.4	2.9	
107-03-9	n-Propyl Mercaptan	ND	23	9.2	ND	7.4	2.9	
624-89-5	Ethyl Methyl Sulfide	ND	23	9.2	ND	7.4	2.9	
110-02-1	Thiophene	ND	25	10	ND	7.4	2.9	
513-44-0	Isobutyl Mercaptan	ND	27	11	ND	7.4	2.9	
352-93-2	Diethyl Sulfide	ND	27	11	ND	7.4	2.9	
109-79-5	n-Butyl Mercaptan	ND	27	11	ND	7.4	2.9	
624-92-0	Dimethyl Disulfide	ND	14	5.7	ND	3.7	1.5	
616-44-4	3-Methylthiophene	ND	29	12	ND	7.4	2.9	
110-01-0	Tetrahydrothiophene	ND	26	11	ND	7.4	2.9	
638-02-8	2,5-Dimethylthiophene	ND	34	13	ND	7.4	2.9	
872-55-9	2-Ethylthiophene	ND	34	13	ND	7.4	2.9	
110-81-6	Diethyl Disulfide	ND	18	15	ND	3.7	2.9	

ND = Compound was analyzed for, but not detected above the laboratory detection limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

H3 = Sample was received and analyzed past holding time.

# RESULTS OF ANALYSIS

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**Client:** GHD Services Inc.  
**Client Sample ID:** P-W  
**Client Project ID:** FMC-Avtex Front Royal, VA / FMCC-11119510-001

ALS Project ID: P1905427  
 ALS Sample ID: P1905427-013

Test Code: ASTM D 5504-12  
 Instrument ID: Agilent 6890A/GC13/SCD  
 Analyst: Wade Henton/Gilbert Gutierrez  
 Sample Type: 6.0 L Silonite Canister  
 Test Notes: **H3**  
 Container ID: SSC00274

Date Collected: 9/4/19  
 Time Collected: 15:10  
 Date Received: 9/12/19  
 Date Analyzed: 9/13/19  
 Time Analyzed: 08:17  
 Volume(s) Analyzed: 1.0 ml(s)

Initial Pressure (psig): -1.87 Final Pressure (psig): 3.60

Container Dilution Factor: 1.43

CAS #	Compound	Result µg/m³	MRL µg/m³	MDL µg/m³	Result ppbV	MRL ppbV	MDL ppbV	Data Qualifier
7783-06-4	Hydrogen Sulfide	7.6	10	3.0	5.4	7.2	2.1	J
463-58-1	Carbonyl Sulfide	ND	18	6.7	ND	7.2	2.7	
74-93-1	Methyl Mercaptan	ND	14	5.6	ND	7.2	2.9	
75-08-1	Ethyl Mercaptan	ND	18	7.3	ND	7.2	2.9	
75-18-3	Dimethyl Sulfide	ND	18	7.3	ND	7.2	2.9	
75-15-0	Carbon Disulfide	22	11	4.5	7.1	3.6	1.4	
75-33-2	Isopropyl Mercaptan	ND	22	8.9	ND	7.2	2.9	
75-66-1	tert-Butyl Mercaptan	ND	26	11	ND	7.2	2.9	
107-03-9	n-Propyl Mercaptan	ND	22	8.9	ND	7.2	2.9	
624-89-5	Ethyl Methyl Sulfide	ND	22	8.9	ND	7.2	2.9	
110-02-1	Thiophene	ND	25	9.8	ND	7.2	2.9	
513-44-0	Isobutyl Mercaptan	ND	26	11	ND	7.2	2.9	
352-93-2	Diethyl Sulfide	ND	26	11	ND	7.2	2.9	
109-79-5	n-Butyl Mercaptan	ND	26	11	ND	7.2	2.9	
624-92-0	Dimethyl Disulfide	ND	14	5.5	ND	3.6	1.4	
616-44-4	3-Methylthiophene	ND	29	11	ND	7.2	2.9	
110-01-0	Tetrahydrothiophene	ND	26	10	ND	7.2	2.9	
638-02-8	2,5-Dimethylthiophene	ND	33	13	ND	7.2	2.9	
872-55-9	2-Ethylthiophene	ND	33	13	ND	7.2	2.9	
110-81-6	Diethyl Disulfide	ND	18	14	ND	3.6	2.9	

ND = Compound was analyzed for, but not detected above the laboratory detection limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

H3 = Sample was received and analyzed past holding time.

J = The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.

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**Client:** GHD Services Inc.  
**Client Sample ID:** P-SW  
**Client Project ID:** FMC-Avtex Front Royal, VA / FMCC-11119510-001

ALS Project ID: P1905427  
 ALS Sample ID: P1905427-015

Test Code: ASTM D 5504-12  
 Instrument ID: Agilent 6890A/GC13/SCD  
 Analyst: Wade Henton/Gilbert Gutierrez  
 Sample Type: 6.0 L Silonite Canister  
 Test Notes: **H3**  
 Container ID: SSC00498

Date Collected: 9/4/19  
 Time Collected: 15:15  
 Date Received: 9/12/19  
 Date Analyzed: 9/13/19  
 Time Analyzed: 08:37  
 Volume(s) Analyzed: 1.0 ml(s)

Initial Pressure (psig): -2.15 Final Pressure (psig): 3.70

Container Dilution Factor: 1.47

CAS #	Compound	Result µg/m <sup>3</sup>	MRL µg/m <sup>3</sup>	MDL µg/m <sup>3</sup>	Result ppbV	MRL ppbV	MDL ppbV	Data Qualifier
7783-06-4	Hydrogen Sulfide	ND	10	3.1	ND	7.4	2.2	
463-58-1	Carbonyl Sulfide	ND	18	6.9	ND	7.4	2.8	
74-93-1	Methyl Mercaptan	ND	14	5.8	ND	7.4	2.9	
75-08-1	Ethyl Mercaptan	ND	19	7.5	ND	7.4	2.9	
75-18-3	Dimethyl Sulfide	ND	19	7.5	ND	7.4	2.9	
75-15-0	Carbon Disulfide	<b>6.4</b>	11	4.6	<b>2.1</b>	3.7	1.5	<b>J</b>
75-33-2	Isopropyl Mercaptan	ND	23	9.2	ND	7.4	2.9	
75-66-1	tert-Butyl Mercaptan	ND	27	11	ND	7.4	2.9	
107-03-9	n-Propyl Mercaptan	ND	23	9.2	ND	7.4	2.9	
624-89-5	Ethyl Methyl Sulfide	ND	23	9.2	ND	7.4	2.9	
110-02-1	Thiophene	ND	25	10	ND	7.4	2.9	
513-44-0	Isobutyl Mercaptan	ND	27	11	ND	7.4	2.9	
352-93-2	Diethyl Sulfide	ND	27	11	ND	7.4	2.9	
109-79-5	n-Butyl Mercaptan	ND	27	11	ND	7.4	2.9	
624-92-0	Dimethyl Disulfide	ND	14	5.7	ND	3.7	1.5	
616-44-4	3-Methylthiophene	ND	29	12	ND	7.4	2.9	
110-01-0	Tetrahydrothiophene	ND	26	11	ND	7.4	2.9	
638-02-8	2,5-Dimethylthiophene	ND	34	13	ND	7.4	2.9	
872-55-9	2-Ethylthiophene	ND	34	13	ND	7.4	2.9	
110-81-6	Diethyl Disulfide	ND	18	15	ND	3.7	2.9	

ND = Compound was analyzed for, but not detected above the laboratory detection limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

H3 = Sample was received and analyzed past holding time.

J = The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.

## RESULTS OF ANALYSIS

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**Client:** GHD Services Inc.  
**Client Sample ID:** P-S  
**Client Project ID:** FMC-Avtex Front Royal, VA / FMCC-11119510-001

ALS Project ID: P1905427  
 ALS Sample ID: P1905427-016

Test Code: ASTM D 5504-12  
 Instrument ID: Agilent 6890A/GC13/SCD  
 Analyst: Wade Henton/Gilbert Gutierrez  
 Sample Type: 6.0 L Silonite Canister  
 Test Notes: **H3**  
 Container ID: SSC00481

Date Collected: 9/4/19  
 Time Collected: 15:18  
 Date Received: 9/12/19  
 Date Analyzed: 9/13/19  
 Time Analyzed: 08:57  
 Volume(s) Analyzed: 1.0 ml(s)

Initial Pressure (psig): -1.80      Final Pressure (psig): 3.69

Container Dilution Factor: 1.43

CAS #	Compound	Result µg/m <sup>3</sup>	MRL µg/m <sup>3</sup>	MDL µg/m <sup>3</sup>	Result ppbV	MRL ppbV	MDL ppbV	Data Qualifier
7783-06-4	Hydrogen Sulfide	ND	10	3.0	ND	7.2	2.1	
463-58-1	Carbonyl Sulfide	ND	18	6.7	ND	7.2	2.7	
74-93-1	Methyl Mercaptan	ND	14	5.6	ND	7.2	2.9	
75-08-1	Ethyl Mercaptan	ND	18	7.3	ND	7.2	2.9	
75-18-3	Dimethyl Sulfide	ND	18	7.3	ND	7.2	2.9	
75-15-0	Carbon Disulfide	ND	11	4.5	ND	3.6	1.4	
75-33-2	Isopropyl Mercaptan	ND	22	8.9	ND	7.2	2.9	
75-66-1	tert-Butyl Mercaptan	ND	26	11	ND	7.2	2.9	
107-03-9	n-Propyl Mercaptan	ND	22	8.9	ND	7.2	2.9	
624-89-5	Ethyl Methyl Sulfide	ND	22	8.9	ND	7.2	2.9	
110-02-1	Thiophene	ND	25	9.8	ND	7.2	2.9	
513-44-0	Isobutyl Mercaptan	ND	26	11	ND	7.2	2.9	
352-93-2	Diethyl Sulfide	ND	26	11	ND	7.2	2.9	
109-79-5	n-Butyl Mercaptan	ND	26	11	ND	7.2	2.9	
624-92-0	Dimethyl Disulfide	ND	14	5.5	ND	3.6	1.4	
616-44-4	3-Methylthiophene	ND	29	11	ND	7.2	2.9	
110-01-0	Tetrahydrothiophene	ND	26	10	ND	7.2	2.9	
638-02-8	2,5-Dimethylthiophene	ND	33	13	ND	7.2	2.9	
872-55-9	2-Ethylthiophene	ND	33	13	ND	7.2	2.9	
110-81-6	Diethyl Disulfide	ND	18	14	ND	3.6	2.9	

ND = Compound was analyzed for, but not detected above the laboratory detection limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

H3 = Sample was received and analyzed past holding time.

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**Client:** GHD Services Inc.  
**Client Sample ID:** P-E  
**Client Project ID:** FMC-Avtex Front Royal, VA / FMCC-11119510-001

ALS Project ID: P1905427  
 ALS Sample ID: P1905427-017

Test Code: ASTM D 5504-12  
 Instrument ID: Agilent 6890A/GC13/SCD  
 Analyst: Wade Henton/Gilbert Gutierrez  
 Sample Type: 6.0 L Silonite Canister  
 Test Notes: **H3**  
 Container ID: SSC00174

Date Collected: 9/4/19  
 Time Collected: 15:25  
 Date Received: 9/12/19  
 Date Analyzed: 9/13/19  
 Time Analyzed: 09:17  
 Volume(s) Analyzed: 1.0 ml(s)

Initial Pressure (psig): -2.98 Final Pressure (psig): 3.65

Container Dilution Factor: 1.57

CAS #	Compound	Result µg/m³	MRL µg/m³	MDL µg/m³	Result ppbV	MRL ppbV	MDL ppbV	Data Qualifier
7783-06-4	Hydrogen Sulfide	15	11	3.3	10	7.9	2.4	
463-58-1	Carbonyl Sulfide	42	19	7.3	17	7.9	3.0	
74-93-1	Methyl Mercaptan	11	15	6.2	5.6	7.9	3.1	J
75-08-1	Ethyl Mercaptan	ND	20	8.0	ND	7.9	3.1	
75-18-3	Dimethyl Sulfide	ND	20	8.0	ND	7.9	3.1	
75-15-0	Carbon Disulfide	430	12	4.9	140	3.9	1.6	
75-33-2	Isopropyl Mercaptan	ND	24	9.8	ND	7.9	3.1	
75-66-1	tert-Butyl Mercaptan	ND	29	12	ND	7.9	3.1	
107-03-9	n-Propyl Mercaptan	ND	24	9.8	ND	7.9	3.1	
624-89-5	Ethyl Methyl Sulfide	ND	24	9.8	ND	7.9	3.1	
110-02-1	Thiophene	24	27	11	7.1	7.9	3.1	J
513-44-0	Isobutyl Mercaptan	ND	29	12	ND	7.9	3.1	
352-93-2	Diethyl Sulfide	ND	29	12	ND	7.9	3.1	
109-79-5	n-Butyl Mercaptan	ND	29	12	ND	7.9	3.1	
624-92-0	Dimethyl Disulfide	8.9	15	6.0	2.3	3.9	1.6	J
616-44-4	3-Methylthiophene	23	32	13	5.7	7.9	3.1	J
110-01-0	Tetrahydrothiophene	ND	28	11	ND	7.9	3.1	
638-02-8	2,5-Dimethylthiophene	ND	36	14	ND	7.9	3.1	
872-55-9	2-Ethylthiophene	ND	36	14	ND	7.9	3.1	
110-81-6	Diethyl Disulfide	ND	20	16	ND	3.9	3.1	

ND = Compound was analyzed for, but not detected above the laboratory detection limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

H3 = Sample was received and analyzed past holding time.

J = The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.



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**Client:** GHD Services Inc.  
**Client Sample ID:** P-NE  
**Client Project ID:** FMC-Avtex Front Royal, VA / FMCC-11119510-001

ALS Project ID: P1905427  
 ALS Sample ID: P1905427-019

Test Code: ASTM D 5504-12  
 Instrument ID: Agilent 6890A/GC13/SCD  
 Analyst: Wade Henton/Gilbert Gutierrez  
 Sample Type: 6.0 L Silonite Canister  
 Test Notes: **H3**  
 Container ID: SSC00489

Date Collected: 9/4/19  
 Time Collected: 15:29  
 Date Received: 9/12/19  
 Date Analyzed: 9/13/19  
 Time Analyzed: 10:14  
 Volume(s) Analyzed: 1.0 ml(s)

Initial Pressure (psig): -1.58      Final Pressure (psig): 3.80

Container Dilution Factor: 1.41

CAS #	Compound	Result µg/m <sup>3</sup>	MRL µg/m <sup>3</sup>	MDL µg/m <sup>3</sup>	Result ppbV	MRL ppbV	MDL ppbV	Data Qualifier
7783-06-4	Hydrogen Sulfide	ND	9.8	2.9	ND	7.1	2.1	
463-58-1	Carbonyl Sulfide	<b>11</b>	17	6.6	<b>4.5</b>	7.1	2.7	<b>J</b>
74-93-1	Methyl Mercaptan	ND	14	5.5	ND	7.1	2.8	
75-08-1	Ethyl Mercaptan	ND	18	7.2	ND	7.1	2.8	
75-18-3	Dimethyl Sulfide	ND	18	7.2	ND	7.1	2.8	
75-15-0	Carbon Disulfide	<b>26</b>	11	4.4	<b>8.5</b>	3.5	1.4	
75-33-2	Isopropyl Mercaptan	ND	22	8.8	ND	7.1	2.8	
75-66-1	tert-Butyl Mercaptan	ND	26	10	ND	7.1	2.8	
107-03-9	n-Propyl Mercaptan	ND	22	8.8	ND	7.1	2.8	
624-89-5	Ethyl Methyl Sulfide	ND	22	8.8	ND	7.1	2.8	
110-02-1	Thiophene	ND	24	9.7	ND	7.1	2.8	
513-44-0	Isobutyl Mercaptan	ND	26	10	ND	7.1	2.8	
352-93-2	Diethyl Sulfide	ND	26	10	ND	7.1	2.8	
109-79-5	n-Butyl Mercaptan	ND	26	10	ND	7.1	2.8	
624-92-0	Dimethyl Disulfide	ND	14	5.4	ND	3.5	1.4	
616-44-4	3-Methylthiophene	ND	28	11	ND	7.1	2.8	
110-01-0	Tetrahydrothiophene	ND	25	10	ND	7.1	2.8	
638-02-8	2,5-Dimethylthiophene	ND	32	13	ND	7.1	2.8	
872-55-9	2-Ethylthiophene	ND	32	13	ND	7.1	2.8	
110-81-6	Diethyl Disulfide	ND	18	14	ND	3.5	2.8	

ND = Compound was analyzed for, but not detected above the laboratory detection limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

H3 = Sample was received and analyzed past holding time.

J = The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.

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**Client:** GHD Services Inc.  
**Client Sample ID:** P-SE  
**Client Project ID:** FMC-Avtex Front Royal, VA / FMCC-11119510-001

ALS Project ID: P1905427  
 ALS Sample ID: P1905427-020

Test Code: ASTM D 5504-12  
 Instrument ID: Agilent 6890A/GC13/SCD  
 Analyst: Wade Henton/Gilbert Gutierrez  
 Sample Type: 6.0 L Silonite Canister  
 Test Notes: **H3**  
 Container ID: SSC00283

Date Collected: 9/4/19  
 Time Collected: 15:33  
 Date Received: 9/12/19  
 Date Analyzed: 9/13/19  
 Time Analyzed: 10:54  
 Volume(s) Analyzed: 1.0 ml(s)

Initial Pressure (psig): -1.92 Final Pressure (psig): 3.68

Container Dilution Factor: 1.44

CAS #	Compound	Result µg/m <sup>3</sup>	MRL µg/m <sup>3</sup>	MDL µg/m <sup>3</sup>	Result ppbV	MRL ppbV	MDL ppbV	Data Qualifier
7783-06-4	Hydrogen Sulfide	ND	10	3.0	ND	7.2	2.2	
463-58-1	Carbonyl Sulfide	ND	18	6.7	ND	7.2	2.7	
74-93-1	Methyl Mercaptan	ND	14	5.7	ND	7.2	2.9	
75-08-1	Ethyl Mercaptan	ND	18	7.3	ND	7.2	2.9	
75-18-3	Dimethyl Sulfide	ND	18	7.3	ND	7.2	2.9	
75-15-0	Carbon Disulfide	<b>6.5</b>	11	4.5	<b>2.1</b>	3.6	1.4	<b>J</b>
75-33-2	Isopropyl Mercaptan	ND	22	9.0	ND	7.2	2.9	
75-66-1	tert-Butyl Mercaptan	ND	27	11	ND	7.2	2.9	
107-03-9	n-Propyl Mercaptan	ND	22	9.0	ND	7.2	2.9	
624-89-5	Ethyl Methyl Sulfide	ND	22	9.0	ND	7.2	2.9	
110-02-1	Thiophene	ND	25	9.9	ND	7.2	2.9	
513-44-0	Isobutyl Mercaptan	ND	27	11	ND	7.2	2.9	
352-93-2	Diethyl Sulfide	ND	27	11	ND	7.2	2.9	
109-79-5	n-Butyl Mercaptan	ND	27	11	ND	7.2	2.9	
624-92-0	Dimethyl Disulfide	ND	14	5.5	ND	3.6	1.4	
616-44-4	3-Methylthiophene	ND	29	12	ND	7.2	2.9	
110-01-0	Tetrahydrothiophene	ND	26	10	ND	7.2	2.9	
638-02-8	2,5-Dimethylthiophene	ND	33	13	ND	7.2	2.9	
872-55-9	2-Ethylthiophene	ND	33	13	ND	7.2	2.9	
110-81-6	Diethyl Disulfide	ND	18	14	ND	3.6	2.9	

ND = Compound was analyzed for, but not detected above the laboratory detection limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

H3 = Sample was received and analyzed past holding time.

J = The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.

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**Client:** GHD Services Inc.  
**Client Sample ID:** OU-7-SE  
**Client Project ID:** FMC-Avtex Front Royal, VA / FMCC-11119510-001

ALS Project ID: P1905427  
 ALS Sample ID: P1905427-021

Test Code: ASTM D 5504-12  
 Instrument ID: Agilent 6890A/GC13/SCD  
 Analyst: Wade Henton/Gilbert Gutierrez  
 Sample Type: 6.0 L Silonite Canister  
 Test Notes: **H3**  
 Container ID: SSC00188

Date Collected: 9/4/19  
 Time Collected: 15:36  
 Date Received: 9/12/19  
 Date Analyzed: 9/13/19  
 Time Analyzed: 12:12  
 Volume(s) Analyzed: 1.0 ml(s)

Initial Pressure (psig): -1.59 Final Pressure (psig): 3.76

Container Dilution Factor: 1.41

CAS #	Compound	Result µg/m³	MRL µg/m³	MDL µg/m³	Result ppbV	MRL ppbV	MDL ppbV	Data Qualifier
7783-06-4	Hydrogen Sulfide	<b>4.3</b>	9.8	2.9	<b>3.1</b>	7.1	2.1	<b>J</b>
463-58-1	Carbonyl Sulfide	ND	17	6.6	ND	7.1	2.7	
74-93-1	Methyl Mercaptan	ND	14	5.5	ND	7.1	2.8	
75-08-1	Ethyl Mercaptan	ND	18	7.2	ND	7.1	2.8	
75-18-3	Dimethyl Sulfide	ND	18	7.2	ND	7.1	2.8	
75-15-0	Carbon Disulfide	<b>9.8</b>	11	4.4	<b>3.1</b>	3.5	1.4	<b>J</b>
75-33-2	Isopropyl Mercaptan	ND	22	8.8	ND	7.1	2.8	
75-66-1	tert-Butyl Mercaptan	ND	26	10	ND	7.1	2.8	
107-03-9	n-Propyl Mercaptan	ND	22	8.8	ND	7.1	2.8	
624-89-5	Ethyl Methyl Sulfide	ND	22	8.8	ND	7.1	2.8	
110-02-1	Thiophene	ND	24	9.7	ND	7.1	2.8	
513-44-0	Isobutyl Mercaptan	ND	26	10	ND	7.1	2.8	
352-93-2	Diethyl Sulfide	ND	26	10	ND	7.1	2.8	
109-79-5	n-Butyl Mercaptan	ND	26	10	ND	7.1	2.8	
624-92-0	Dimethyl Disulfide	ND	14	5.4	ND	3.5	1.4	
616-44-4	3-Methylthiophene	ND	28	11	ND	7.1	2.8	
110-01-0	Tetrahydrothiophene	ND	25	10	ND	7.1	2.8	
638-02-8	2,5-Dimethylthiophene	ND	32	13	ND	7.1	2.8	
872-55-9	2-Ethylthiophene	ND	32	13	ND	7.1	2.8	
110-81-6	Diethyl Disulfide	ND	18	14	ND	3.5	2.8	

ND = Compound was analyzed for, but not detected above the laboratory detection limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

H3 = Sample was received and analyzed past holding time.

J = The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.

RESULTS OF ANALYSIS

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**Client:** GHD Services Inc.  
**Client Sample ID:** OU-7-S  
**Client Project ID:** FMC-Avtex Front Royal, VA / FMCC-11119510-001

ALS Project ID: P1905427  
 ALS Sample ID: P1905427-022

Test Code: ASTM D 5504-12  
 Instrument ID: Agilent 6890A/GC13/SCD  
 Analyst: Wade Henton/Gilbert Gutierrez  
 Sample Type: 6.0 L Silonite Canister  
 Test Notes: **H3**  
 Container ID: SSC00416

Date Collected: 9/4/19  
 Time Collected: 14:48  
 Date Received: 9/12/19  
 Date Analyzed: 9/13/19  
 Time Analyzed: 11:39  
 Volume(s) Analyzed: 1.0 ml(s)

Initial Pressure (psig): -2.01      Final Pressure (psig): 4.13

Container Dilution Factor: 1.48

CAS #	Compound	Result µg/m³	MRL µg/m³	MDL µg/m³	Result ppbV	MRL ppbV	MDL ppbV	Data Qualifier
7783-06-4	Hydrogen Sulfide	<b>5.7</b>	10	3.1	<b>4.1</b>	7.4	2.2	<b>J</b>
463-58-1	Carbonyl Sulfide	ND	18	6.9	ND	7.4	2.8	
74-93-1	Methyl Mercaptan	ND	15	5.8	ND	7.4	3.0	
75-08-1	Ethyl Mercaptan	ND	19	7.5	ND	7.4	3.0	
75-18-3	Dimethyl Sulfide	ND	19	7.5	ND	7.4	3.0	
75-15-0	Carbon Disulfide	<b>7.1</b>	12	4.6	<b>2.3</b>	3.7	1.5	<b>J</b>
75-33-2	Isopropyl Mercaptan	ND	23	9.2	ND	7.4	3.0	
75-66-1	tert-Butyl Mercaptan	ND	27	11	ND	7.4	3.0	
107-03-9	n-Propyl Mercaptan	ND	23	9.2	ND	7.4	3.0	
624-89-5	Ethyl Methyl Sulfide	ND	23	9.2	ND	7.4	3.0	
110-02-1	Thiophene	ND	25	10	ND	7.4	3.0	
513-44-0	Isobutyl Mercaptan	ND	27	11	ND	7.4	3.0	
352-93-2	Diethyl Sulfide	ND	27	11	ND	7.4	3.0	
109-79-5	n-Butyl Mercaptan	ND	27	11	ND	7.4	3.0	
624-92-0	Dimethyl Disulfide	ND	14	5.7	ND	3.7	1.5	
616-44-4	3-Methylthiophene	ND	30	12	ND	7.4	3.0	
110-01-0	Tetrahydrothiophene	ND	27	11	ND	7.4	3.0	
638-02-8	2,5-Dimethylthiophene	ND	34	14	ND	7.4	3.0	
872-55-9	2-Ethylthiophene	ND	34	14	ND	7.4	3.0	
110-81-6	Diethyl Disulfide	ND	18	15	ND	3.7	3.0	

ND = Compound was analyzed for, but not detected above the laboratory detection limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

H3 = Sample was received and analyzed past holding time.

J = The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.

RESULTS OF ANALYSIS

Page 1 of 1

**Client:** GHD Services Inc.  
**Client Sample ID:** Method Blank  
**Client Project ID:** FMC-Avtex Front Royal, VA / FMCC-11119510-001

ALS Project ID: P1905427  
 ALS Sample ID: P190913-MB

Test Code: ASTM D 5504-12  
 Instrument ID: Agilent 6890A/GC13/SCD  
 Analyst: Wade Henton/Gilbert Gutierrez  
 Sample Type: 6.0 L Silonite Canister  
 Test Notes:

Date Collected: NA  
 Time Collected: NA  
 Date Received: NA  
 Date Analyzed: 9/13/19  
 Time Analyzed: 07:53  
 Volume(s) Analyzed: 1.0 ml(s)

CAS #	Compound	Result µg/m³	MRL µg/m³	MDL µg/m³	Result ppbV	MRL ppbV	MDL ppbV	Data Qualifier
7783-06-4	Hydrogen Sulfide	ND	7.0	2.1	ND	5.0	1.5	
463-58-1	Carbonyl Sulfide	ND	12	4.7	ND	5.0	1.9	
74-93-1	Methyl Mercaptan	ND	9.8	3.9	ND	5.0	2.0	
75-08-1	Ethyl Mercaptan	ND	13	5.1	ND	5.0	2.0	
75-18-3	Dimethyl Sulfide	ND	13	5.1	ND	5.0	2.0	
75-15-0	Carbon Disulfide	ND	7.8	3.1	ND	2.5	1.0	
75-33-2	Isopropyl Mercaptan	ND	16	6.2	ND	5.0	2.0	
75-66-1	tert-Butyl Mercaptan	ND	18	7.4	ND	5.0	2.0	
107-03-9	n-Propyl Mercaptan	ND	16	6.2	ND	5.0	2.0	
624-89-5	Ethyl Methyl Sulfide	ND	16	6.2	ND	5.0	2.0	
110-02-1	Thiophene	ND	17	6.9	ND	5.0	2.0	
513-44-0	Isobutyl Mercaptan	ND	18	7.4	ND	5.0	2.0	
352-93-2	Diethyl Sulfide	ND	18	7.4	ND	5.0	2.0	
109-79-5	n-Butyl Mercaptan	ND	18	7.4	ND	5.0	2.0	
624-92-0	Dimethyl Disulfide	ND	9.6	3.9	ND	2.5	1.0	
616-44-4	3-Methylthiophene	ND	20	8.0	ND	5.0	2.0	
110-01-0	Tetrahydrothiophene	ND	18	7.2	ND	5.0	2.0	
638-02-8	2,5-Dimethylthiophene	ND	23	9.2	ND	5.0	2.0	
872-55-9	2-Ethylthiophene	ND	23	9.2	ND	5.0	2.0	
110-81-6	Diethyl Disulfide	ND	12	10	ND	2.5	2.0	

ND = Compound was analyzed for, but not detected above the laboratory detection limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

RESULTS OF ANALYSIS

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**Client:** GHD Services Inc.  
**Client Sample ID:** Method Blank  
**Client Project ID:** FMC-Avtex Front Royal, VA / FMCC-11119510-001

ALS Project ID: P1905427  
 ALS Sample ID: P190913-MB

Test Code: ASTM D 5504-12  
 Instrument ID: Agilent 7890A/GC22/SCD  
 Analyst: Wade Henton/Gilbert Gutierrez  
 Sample Type: 6.0 L Silonite Canister  
 Test Notes:

Date Collected: NA  
 Time Collected: NA  
 Date Received: NA  
 Date Analyzed: 9/13/19  
 Time Analyzed: 07:53  
 Volume(s) Analyzed: 1.0 ml(s)

CAS #	Compound	Result µg/m³	MRL µg/m³	MDL µg/m³	Result ppbV	MRL ppbV	MDL ppbV	Data Qualifier
7783-06-4	Hydrogen Sulfide	ND	7.0	2.1	ND	5.0	1.5	
463-58-1	Carbonyl Sulfide	ND	12	4.7	ND	5.0	1.9	
74-93-1	Methyl Mercaptan	ND	9.8	3.9	ND	5.0	2.0	
75-08-1	Ethyl Mercaptan	ND	13	5.1	ND	5.0	2.0	
75-18-3	Dimethyl Sulfide	ND	13	5.1	ND	5.0	2.0	
75-15-0	Carbon Disulfide	ND	7.8	3.1	ND	2.5	1.0	
75-33-2	Isopropyl Mercaptan	ND	16	6.2	ND	5.0	2.0	
75-66-1	tert-Butyl Mercaptan	ND	18	7.4	ND	5.0	2.0	
107-03-9	n-Propyl Mercaptan	ND	16	6.2	ND	5.0	2.0	
624-89-5	Ethyl Methyl Sulfide	ND	16	6.2	ND	5.0	2.0	
110-02-1	Thiophene	ND	17	6.9	ND	5.0	2.0	
513-44-0	Isobutyl Mercaptan	ND	18	7.4	ND	5.0	2.0	
352-93-2	Diethyl Sulfide	ND	18	7.4	ND	5.0	2.0	
109-79-5	n-Butyl Mercaptan	ND	18	7.4	ND	5.0	2.0	
624-92-0	Dimethyl Disulfide	ND	9.6	3.9	ND	2.5	1.0	
616-44-4	3-Methylthiophene	ND	20	8.0	ND	5.0	2.0	
110-01-0	Tetrahydrothiophene	ND	18	7.2	ND	5.0	2.0	
638-02-8	2,5-Dimethylthiophene	ND	23	9.2	ND	5.0	2.0	
872-55-9	2-Ethylthiophene	ND	23	9.2	ND	5.0	2.0	
110-81-6	Diethyl Disulfide	ND	12	10	ND	2.5	2.0	

ND = Compound was analyzed for, but not detected above the laboratory detection limit.

MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

LABORATORY CONTROL SAMPLE SUMMARY

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**Client:** GHD Services Inc.  
**Client Sample ID:** Lab Control Sample  
**Client Project ID:** FMC-Avtex Front Royal, VA / FMCC-11119510-001

ALS Project ID: P1905427  
 ALS Sample ID: P190913-LCS

Test Code: ASTM D 5504-12  
 Instrument ID: Agilent 6890A/GC13/SCD  
 Analyst: Wade Henton/Gilbert Gutierrez  
 Sample Type: 6.0 L Silonite Canister  
 Test Notes:

Date Collected: NA  
 Date Received: NA  
 Date Analyzed: 9/13/19  
 Volume(s) Analyzed: NA ml(s)

CAS #	Compound	Spike Amount µg/m <sup>3</sup>	Result µg/m <sup>3</sup>	% Recovery	ALS	Data Qualifier
					Acceptance Limits	
7783-06-4	Hydrogen Sulfide	1,380	1,190	86	72-122	
463-58-1	Carbonyl Sulfide	2,580	2,280	88	72-121	
74-93-1	Methyl Mercaptan	2,070	1,870	90	74-127	



LABORATORY CONTROL SAMPLE SUMMARY

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**Client:** GHD Services Inc.  
**Client Sample ID:** Lab Control Sample  
**Client Project ID:** FMC-Avtex Front Royal, VA / FMCC-11119510-001

ALS Project ID: P1905427  
 ALS Sample ID: P190913-LCS

Test Code: ASTM D 5504-12  
 Instrument ID: Agilent 7890A/GC22/SCD  
 Analyst: Wade Henton/Gilbert Gutierrez  
 Sample Type: 6.0 L Silonite Canister  
 Test Notes:

Date Collected: NA  
 Date Received: NA  
 Date Analyzed: 9/13/19  
 Volume(s) Analyzed: NA ml(s)

CAS #	Compound	Spike Amount µg/m <sup>3</sup>	Result µg/m <sup>3</sup>	% Recovery	ALS	Data Qualifier
					Acceptance Limits	
7783-06-4	Hydrogen Sulfide	1,380	<b>1,070</b>	<b>78</b>	72-122	
463-58-1	Carbonyl Sulfide	2,580	<b>1,940</b>	<b>75</b>	72-121	
74-93-1	Methyl Mercaptan	2,070	<b>1,860</b>	<b>90</b>	74-127	

## **ATTACHMENT 4**

GLTP Discharge Monitoring and Information:

Table 4.1 – Monthly Flow Totals Avtex Site Lift Stations, Test Wells and Viscose Basin

Table 4.2 - Site Rainfall Data

**Table 4.1 Monthly Flow Totals - Fourth Quarter 2019**  
**Avtex Site Lift Stations, Test Wells and Viscose Basin**

October 2019											
Lift Stations Flow Report			Test Wells Flow Report				Viscose Basin Flow Report				
Date	Total LS Flow (MGD)		Date	TW1 Flow (MGD)	TW2 Flow (MGD)		TW3 Flow (MGD)	Date	VB9 Flow (MGD)	VB10 Flow (MGD)	VB 11 Flow (MGD)
10/1/2019	0.081		10/1/2019	0.028	0.000	0.025		10/1/2019	0.002	0.002	0.020
10/2/2019	0.071		10/2/2019	0.059	0.000	0.028		10/2/2019	0.002	0.000	0.020
10/3/2019	0.075		10/3/2019	0.066	0.000	0.015		10/3/2019	0.002	0.000	0.020
10/4/2019	0.075		10/4/2019	0.066	0.000	0.002		10/4/2019	0.002	0.000	0.020
10/5/2019	0.060		10/5/2019	0.066	0.000	0.002		10/5/2019	0.000	0.000	0.020
10/6/2019	0.079		10/6/2019	0.066	0.000	0.000		10/6/2019	0.000	0.000	0.020
10/7/2019	0.079		10/7/2019	0.066	0.000	0.020		10/7/2019	0.002	0.002	0.020
10/8/2019	0.070		10/8/2019	0.066	0.000	0.025		10/8/2019	0.002	0.002	0.020
10/9/2019	0.075		10/9/2019	0.066	0.000	0.028		10/9/2019	0.002	0.000	0.020
10/10/2019	0.075		10/10/2019	0.066	0.000	0.006		10/10/2019	0.002	0.002	0.020
10/11/2019	0.067		10/11/2019	0.066	0.000	0.010		10/11/2019	0.002	0.002	0.020
10/12/2019	0.077		10/12/2019	0.066	0.000	0.025		10/12/2019	0.002	0.000	0.020
10/13/2019	0.077		10/13/2019	0.066	0.000	0.028		10/13/2019	0.000	0.000	0.020
10/14/2019	0.071		10/14/2019	0.066	0.000	0.028		10/14/2019	0.000	0.000	0.020
10/15/2019	0.058		10/15/2019	0.059	0.000	0.005		10/15/2019	0.004	0.000	0.020
10/16/2019	0.069		10/16/2019	0.066	0.000	0.000		10/16/2019	0.004	0.000	0.020
10/17/2019	0.071		10/17/2019	0.066	0.000	0.000		10/17/2019	0.003	0.000	0.020
10/18/2019	0.075		10/18/2019	0.066	0.000	0.010		10/18/2019	0.004	0.000	0.020
10/19/2019	0.075		10/19/2019	0.040	0.000	0.025		10/19/2019	0.004	0.000	0.020
10/20/2019	0.066		10/20/2019	0.000	0.000	0.028		10/20/2019	0.004	0.000	0.020
10/21/2019	0.079		10/21/2019	0.047	0.000	0.028		10/21/2019	0.000	0.000	0.020
10/22/2019	0.079		10/22/2019	0.060	0.000	0.029		10/22/2019	0.000	0.000	0.020
10/23/2019	0.057		10/23/2019	0.066	0.000	0.029		10/23/2019	0.000	0.000	0.020
10/24/2019	0.057		10/24/2019	0.066	0.000	0.029		10/24/2019	0.000	0.000	0.021
10/25/2019	0.096		10/25/2019	0.066	0.000	0.010		10/25/2019	0.002	0.000	0.021
10/26/2019	0.096		10/26/2019	0.066	0.000	0.000		10/26/2019	0.002	0.000	0.021
10/27/2019	0.067		10/27/2019	0.066	0.000	0.000		10/27/2019	0.000	0.000	0.021
10/28/2019	0.076		10/28/2019	0.066	0.000	0.020		10/28/2019	0.002	0.002	0.021
10/29/2019	0.076		10/29/2019	0.047	0.000	0.025		10/29/2019	0.002	0.002	0.021
10/30/2019	0.057		10/30/2019	0.059	0.000	0.028		10/30/2019	0.002	0.001	0.021
10/31/2019	0.080		10/31/2019	0.066	0.000	0.028		10/31/2019	0.000	0.000	0.021

**Table 4.1 Monthly Flow Totals - Fourth Quarter 2019**  
**Avtex Site Lift Stations, Test Wells and Viscose Basin**

<b>November 2019</b>									
<b>Lift Stations Flow Report</b>		<b>Test Wells Flow Report</b>				<b>Viscose Basin Flow Report</b>			
<b>Date</b>	<b>Total LS Flow (MGD)</b>	<b>Date</b>	<b>TW1 Flow (MGD)</b>	<b>TW2 Flow (MGD)</b>	<b>TW3 Flow (MGD)</b>	<b>Date</b>	<b>VB9 Flow (MGD)</b>	<b>VB10 Flow (MGD)</b>	<b>VB 11 Flow (MGD)</b>
11/1/2019	0.080	11/1/2019	0.059	0.000	0.005	11/1/2019	0.000	0.000	0.021
11/2/2019	0.061	11/2/2019	0.066	0.000	0.000	11/2/2019	0.000	0.000	0.021
11/3/2019	0.065	11/3/2019	0.066	0.000	0.018	11/3/2019	0.000	0.000	0.021
11/4/2019	0.065	11/4/2019	0.064	0.000	0.021	11/4/2019	0.002	0.002	0.021
11/5/2019	0.061	11/5/2019	0.066	0.000	0.006	11/5/2019	0.002	0.002	0.021
11/6/2019	0.066	11/6/2019	0.066	0.000	0.000	11/6/2019	0.002	0.001	0.021
11/7/2019	0.066	11/7/2019	0.066	0.000	0.000	11/7/2019	0.002	0.002	0.021
11/8/2019	0.060	11/8/2019	0.066	0.000	0.000	11/8/2019	0.002	0.002	0.021
11/9/2019	0.079	11/9/2019	0.065	0.000	0.000	11/9/2019	0.002	0.000	0.021
11/10/2019	0.079	11/10/2019	0.016	0.000	0.000	11/10/2019	0.000	0.000	0.021
11/11/2019	0.071	11/11/2019	0.046	0.000	0.020	11/11/2019	0.001	0.002	0.021
11/12/2019	0.070	11/12/2019	0.059	0.000	0.025	11/12/2019	0.002	0.002	0.021
11/13/2019	0.070	11/13/2019	0.066	0.000	0.028	11/13/2019	0.002	0.001	0.021
11/14/2019	0.072	11/14/2019	0.065	0.000	0.028	11/14/2019	0.003	0.001	0.021
11/15/2019	0.136	11/15/2019	0.066	0.000	0.029	11/15/2019	0.003	0.001	0.021
11/16/2019	0.136	11/16/2019	0.065	0.000	0.028	11/16/2019	0.003	0.000	0.021
11/17/2019	0.064	11/17/2019	0.065	0.000	0.028	11/17/2019	0.000	0.000	0.022
11/18/2019	0.089	11/18/2019	0.065	0.000	0.028	11/18/2019	0.002	0.001	0.022
11/19/2019	0.089	11/19/2019	0.027	0.000	0.020	11/19/2019	0.002	0.001	0.022
11/20/2019	0.068	11/20/2019	0.059	0.000	0.020	11/20/2019	0.002	0.000	0.022
11/21/2019	0.067	11/21/2019	0.066	0.000	0.014	11/21/2019	0.001	0.000	0.022
11/22/2019	0.078	11/22/2019	0.066	0.000	0.025	11/22/2019	0.002	0.002	0.022
11/23/2019	0.078	11/23/2019	0.065	0.000	0.028	11/23/2019	0.002	0.002	0.022
11/24/2019	0.074	11/24/2019	0.059	0.000	0.014	11/24/2019	0.000	0.000	0.022
11/25/2019	0.102	11/25/2019	0.065	0.000	0.000	11/25/2019	0.002	0.001	0.022
11/26/2019	0.104	11/26/2019	0.065	0.000	0.000	11/26/2019	0.002	0.001	0.022
11/27/2019	0.066	11/27/2019	0.065	0.000	0.012	11/27/2019	0.002	0.000	0.022
11/28/2019	0.066	11/28/2019	0.065	0.000	0.020	11/28/2019	0.000	0.000	0.022
11/29/2019	0.066	11/29/2019	0.059	0.000	0.020	11/29/2019	0.000	0.000	0.022
11/30/2019	0.070	11/30/2019	0.065	0.000	0.000	11/30/2019	0.000	0.000	0.022

**Table 4.1 Monthly Flow Totals - Fourth Quarter 2019**  
**Avtex Site Lift Stations, Test Wells and Viscose Basin**

December 2019											
Lift Stations Flow Report			Test Wells Flow Report					Viscose Basin Flow Report			
Date	Total LS Flow (MGD)		Date	TW1 Flow (MGD)	TW2 Flow (MGD)	TW3 Flow (MGD)		Date	VB9 Flow (MGD)	VB10 Flow (MGD)	VB 11 Flow (MGD)
12/1/2019	0.070		12/1/2019	0.065	0.000	0.000		12/1/2019	0.000	0.000	0.022
12/2/2019	0.052		12/2/2019	0.065	0.000	0.001		12/2/2019	0.001	0.002	0.023
12/3/2019	0.071		12/3/2019	0.065	0.000	0.001		12/3/2019	0.002	0.002	0.023
12/4/2019	0.071		12/4/2019	0.064	0.000	0.010		12/4/2019	0.002	0.000	0.023
12/5/2019	0.067		12/5/2019	0.065	0.000	0.013		12/5/2019	0.004	0.001	0.023
12/6/2019	0.073		12/6/2019	0.065	0.000	0.005		12/6/2019	0.004	0.001	0.023
12/7/2019	0.073		12/7/2019	0.065	0.000	0.000		12/7/2019	0.003	0.000	0.023
12/8/2019	0.068		12/8/2019	0.065	0.000	0.000		12/8/2019	0.000	0.000	0.023
12/9/2019	0.071		12/9/2019	0.065	0.000	0.020		12/9/2019	0.003	0.001	0.023
12/10/2019	0.071		12/10/2019	0.065	0.000	0.023		12/10/2019	0.004	0.001	0.023
12/11/2019	0.054		12/11/2019	0.065	0.000	0.005		12/11/2019	0.004	0.000	0.023
12/12/2019	0.071		12/12/2019	0.065	0.000	0.000		12/12/2019	0.004	0.000	0.023
12/13/2019	0.071		12/13/2019	0.065	0.000	0.000		12/13/2019	0.004	0.000	0.023
12/14/2019	0.064		12/14/2019	0.065	0.000	0.000		12/14/2019	0.003	0.000	0.023
12/15/2019	0.068		12/15/2019	0.065	0.000	0.000		12/15/2019	0.000	0.000	0.023
12/16/2019	0.068		12/16/2019	0.065	0.000	0.000		12/16/2019	0.002	0.002	0.023
12/17/2019	0.062		12/17/2019	0.065	0.000	0.000		12/17/2019	0.002	0.002	0.023
12/18/2019	0.068		12/18/2019	0.065	0.000	0.000		12/18/2019	0.002	0.000	0.024
12/19/2019	0.068		12/19/2019	0.065	0.000	0.000		12/19/2019	0.001	0.001	0.024
12/20/2019	0.050		12/20/2019	0.065	0.000	0.000		12/20/2019	0.001	0.001	0.024
12/21/2019	0.068		12/21/2019	0.065	0.000	0.000		12/21/2019	0.000	0.000	0.024
12/22/2019	0.068		12/22/2019	0.065	0.000	0.000		12/22/2019	0.000	0.000	0.024
12/23/2019	0.063		12/23/2019	0.065	0.000	0.000		12/23/2019	0.000	0.000	0.024
12/24/2019	0.071		12/24/2019	0.065	0.000	0.000		12/24/2019	0.000	0.000	0.024
12/25/2019	0.072		12/25/2019	0.065	0.000	0.000		12/25/2019	0.000	0.000	0.024
12/26/2019	0.057		12/26/2019	0.065	0.000	0.000		12/26/2019	0.003	0.002	0.024
12/27/2019	0.052		12/27/2019	0.046	0.000	0.000		12/27/2019	0.003	0.002	0.024
12/28/2019	0.029		12/28/2019	0.057	0.000	0.000		12/28/2019	0.003	0.000	0.024
12/29/2019	0.059		12/29/2019	0.063	0.000	0.000		12/29/2019	0.000	0.000	0.024
12/30/2019	0.071		12/30/2019	0.065	0.000	0.000		12/30/2019	0.002	0.001	0.024
12/31/2019	0.071		12/31/2019	0.065	0.000	0.000		12/31/2019	0.002	0.001	0.024

Table 4.2

## Site Rainfall Data Avtex Fibers Superfund Site October 1 - December 31, 2019

Month	Average Rainfall for Winchester, VA (in)*	Average Site Rainfall 1990-2013 (in)	2006 Actual Rainfall (in)	2007 Actual Rainfall (in)	2008 Actual Rainfall (in)	2009 Actual Rainfall (in)	2010 Actual Rainfall (in)	2011 Actual Rainfall (in)	2012 Actual Rainfall (in)	2013 Actual Rainfall (in)	2014 Actual Rainfall (in)	2015 Actual Rainfall (in)	2016 Actual Rainfall (in)	2017 Actual Rainfall (in)	2018 Actual Rainfall (in)	2019 Actual Rainfall (in)	Percent of Average Site Rainfall (%)
January	2.4	2.7	2.0	1.2	1.0	1.4	3.35	0.9	2.0	3.8	1.1	1.4	1.2	2.5	1.8	3.9	146%
February	2.5	2.3	1.7	1.9	2.3	0.0	4.35	1.4	2.3	0.9	3.2	0.7	2.2	0.8	2.0	3.4	149%
March	3.1	3.6	0.1	3.7	2.9	1.5	5.7	4.6	1.9	3.9	2.3	1.7	1.0	2.4	0.8	4.6	126%
April	3.1	3.2	2.8	3.4	6.2	3.2	1.59	6.5	2.5	1.3	1.5	2.9	1.3	1.7	2.4	2.8	88%
May	3.7	3.8	1.0	1.9	5.2	5.8	3.25	5.6	3.6	2.4	7.2	1.6	3.9	7.0	7.7	5.1	133%
June	3.9	4.4	9.7	3.5	4.3	4.6	0.6	4.0	3.6	5.2	1.5	3.9	3.8	1.3	9.9	1.6	35%
July	3.9	3.4	2.2	1.7	3.8	3.0	1.8	3.1	4.3	1.9	4.6	1.8	5.4	6.7	6.1	2.7	80%
August	3.5	3.1	1.3	2.8	3.5	2.1	3.3	3.4	5.2	2.6	3.7	1.0	2.3	2.1	4.1	4.8	155%
September	3.1	4.7	6.1	2.0	4.3	1.3	5.7	5.5	4.9	2.5	1.6	3.6	6.1	1.3	5.9	0.3	7%
October	3.2	3.0	4.3	4.1	1.2	2.7	0.65	3.9	4.3	5.1	5.17	1.65	0.6	3.5	1.3	2.0	67%
November	3.1	2.9	5.2	1.6	2.5	3.7	1.8	3.0	1.1	1.6	1.83	1.36	0.8	0.9	4.7	0.6	19%
December	2.5	2.6	0.7	2.8	1.4	5.0	2.0	3.6	1.55	1.5	3.02	2.46	1.5	0.4	3.7	0.3	12%
<b>Totals to Date</b>	<b>37.9</b>	<b>39.6</b>	<b>36.9</b>	<b>30.4</b>	<b>38.5</b>	<b>34.2</b>	<b>34.1</b>	<b>45.2</b>	<b>37.0</b>	<b>32.8</b>	<b>36.7</b>	<b>24.1</b>	<b>30.0</b>	<b>30.4</b>	<b>50.3</b>	<b>32.1</b>	<b>81%</b>

\* Source: National Climate Data Center TD 9641 Clim 81